

INTRO TO GLOBAL WMD ISSUES

INTA 2042



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3 credits
TTh 4:30 – 5:45PM
IC 217

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Overview

This course will explore the challenges of weapons of mass destruction (WMD). We will examine the characteristics and address the problems posed by nuclear, chemical, and biological weapons. Topics covered will include history and major theoretical frameworks relating to WMD, such as the development, use, and motivations of major state weapons programs and non-state actors. We will explore efforts to control technology, material, and knowledge – *to limit proliferation* – via multilateral agreements, initiatives, export control, and national legislation, particularly evaluating the efforts to limit “rogue” state and terrorist acquisition. Strategies and regimes for implementing compliance and verification will be considered, along with their limitations. Counterproliferation strategies to deter, deny, and passively or actively defend against nuclear, biological, and chemical weapons will be studied. Also examined will be proliferation concerns related to emerging technologies, e.g., space weapons, biotechnology, nanotechnology, and synthetic genomics.

15 August 2017

Learning Outcomes

- Students will understand causal and determinant relationships between science and technology (S&T) and international affairs across different topic areas.
- Students will understand and learn about how S&T shaped the history of WMD, promising S&T developments related to global WMD issues, and pressing S&T challenges for the future in an international context.
- Students will demonstrate ability to apply concepts and multiple methodologies to explain phenomena in WMD security related to S&T.
- Students will understand and be able to assess relationships between organizational institutions, governance entities & structures (e.g., international agreements and institutions) and WMD, including organizations with S&T missions.
- Students will be able to use their knowledge of international affairs in a practical problem-solving way to address issues of immediate international concern.

General Education

- Learning Goal E: Social Sciences. Student will demonstrate the ability to describe the social, political, and economic forces that influence social behavior.

Course Materials

Two texts are required:

- 1) Joseph Cirincione, Jon Wolfsthal, Miriam Rajkumar, *Deadly Arsenals: Nuclear, Biological, and Chemical Threats*, Second Edition Revised and Expanded, 2005
- 2) Jonathan Tucker (editor), *Toxic Terror: Assessing Terrorist Use of Chemical and Biological Weapons*, MIT Press, 2000

Other short articles will be required reading; these will be announced in class and posted on the T-square course website (<https://t-square.gatech.edu>).

Class Requirements

- 1) *Last Best Chance* film discussion questions (5%)
- 2) 1st Mid-term exam (30%)
- 3) 2nd Mid-term exam (30%)
- 4) Final Exam (30%)
- 5) Attendance (5%)

Attendance and Participation

You are expected to make reasonable efforts to attend all classes and participate actively. Attendance will be taken randomly throughout the semester. I recognize that both anticipated and unanticipated events may overlap with the regularly scheduled class. Attendance will be taken 11 random times throughout the semester. Students may miss one of those instances without incurring any effect on your attendance grade.

Grade Change Policy

Appeals for grade changes should be reasonable both in argument and submission time, i.e., within two weeks of return. Specific detailed information on grade change will be distributed upon return of assignments.

Academic Integrity

For all assignments, materials, and exams, you are expected to maintain the highest academic integrity.

Per the Georgia Tech Honor Code, plagiarism is an act of academic misconduct. The Georgia Tech Honor Code specifies: “Plagiarism’ is the act of appropriating the literary composition of another, or parts of passages of his or her writings, or language or ideas of the same, and passing them off as the product of one’s own mind. It involves the deliberate use of any outside source without proper acknowledgment.” Plagiarism ranges from the blatant – purchasing a term paper or copying on an exam – to the subtle – failing to credit another author with the flow of ideas in an argument. Simply changing a few words from the writings of other authors does not alter the fact that you are essentially quoting from them. Paraphrasing of this sort, where you use the words of another almost verbatim without acknowledging your source, is the most common form of plagiarism among undergraduate students and academics. When you state another author’s viewpoint, theory, or hypothesis – especially when it is original or not generally accepted – you must also include a reference to the originator. In general citations are unnecessary when the information is considered common knowledge or a matter of widespread agreement or controversy.

More simply put: don’t cheat.

When in any doubt, give credit.

For more information on the Georgia Tech Honor Code, please see <http://www.honor.gatech.edu>.

Accommodations for students with disabilities

Per Georgia Tech policy: if you have a significant disability, special arrangements will be made to accommodate documented needs (through the ADAPTS office). Please contact me after class or at your earliest convenience.

THE SYLLABUS IS DYNAMIC AND IS LIKELY TO BE UPDATED THROUGHOUT THE SEMESTER.

Course Calendar and Content

WEEK 1

22 & 24 August

Overview of the class, syllabus, and class requirements.

Introduction to current issues.

Atomic physics & start of the nuclear age

Required Reading:

- DNI Coat’s Statement for the Record of the Worldwide Threat Assessment of the US Intelligence Community, pp 1-8,
<https://www.dni.gov/files/documents/Newsroom/Testimonies/SSCI%20Unclassified%20SFR%20-%20Final.pdf>
- George Shultz, William Perry, Henry Kissinger, & Sam Nunn, “Next Steps in Reducing Nuclear Risks,” *WSJ*, 5 March 2013,
<http://online.wsj.com/article/SB10001424127887324338604578325912939001772.html> or <http://www.nti.org/analysis/opinions/next-steps-reducing-nuclear-risks-pace-nonproliferation-work-today-doesnt-match-urgency-threat/>
- Robert Gates, “Nuclear Weapons and Deterrence in the 21st Century,” Remarks at the Carnegie Endowment for International Peace, 28 October 2008,
http://carnegieendowment.org/files/1028_transcrip_gates_checked.pdf

Required Web Subscription:

- *Proliferation News*: A twice-weekly email of aggregated news on nuclear nonproliferation from the Carnegie Endowment for International Peace,
<http://carnegieendowment.org/publications/pronews/>

//or//

- *Nuclear Policy News*: A daily email of news clips from around the world on nuclear issues from the Center for Strategic and International Studies' Project on Nuclear Issues, <http://poniforum.csis.org/nuclear-news>

//and//

- *Health Security Headlines*: a daily update on US and global health security from the UPMC Center for Health security, <http://www.upmchealthsecurity.org/resources/hsh/>

WEEK 2

29 & 31 August

The nuclear revolution
Use at the end of World War II
Nuclear weapons complex, expansion, & testing
Nuclear proliferation

Required Reading:

- *Deadly Arsenals*, Chapter 1-3

Optional Podcast:

- MIT Technology and Culture Forum with Joe Cirincione on “Bomb Scare: The History and Future of Nuclear Weapons,” 13 December 2011, <http://techtv.mit.edu/videos/16218-bomb-scare-the-history-and-future-of-nuclear-weapons>

Optional Reading:

- OTA, *Technologies Underlying Weapons of Mass Destruction* (Washington, DC: OTA 1993), chapter 4, “Technical Aspects of Nuclear Proliferation,” pp 119-195, <http://www.fas.org/spp/starwars/ota/934406.pdf>

WEEK 3

5 & 7 September

Nuclear terrorism

Required Reading:

- *Deadly Arsenals*, Chapter 14 &15
- Rolf Mowatt-Larssen, “Al Qaeda Weapons of Mass Destruction Threat: Hype or Reality?” January 2010, <http://belfercenter.ksg.harvard.edu/files/al-qaeda-wmd-threat.pdf>
- *Toxic Terror*, Appendix

Required Viewing:

- Watch: *Last Best Chance & Nuclear Tipping Point*

Browse:

- Movie website: <http://www.lastbestchance.org/>
- Documentary website: <http://www.nucleartippingpoint.org/home.html>

WEEK 4

12 September

Arms control, disarmament, and nonproliferation
The Nuclear Non-Proliferation Treaty (NPT) & other treaties
Cooperative Threat Reduction (CTR)
The Iran nuclear deal

Required Reading:

- *Deadly Arsenals*, Chapter 6-10
- *Deadly Arsenals*, Chapter 11-13; Appendixes A (NPT), D (Nuclear Suppliers Group), E (CTBT)

Optional Reading:

- Sam Nunn, “Away from a World of Peril,” *Survival*, February-March 2012, pp 234–244, <http://www.tandfonline.com/doi/abs/10.1080/00396338.2012.657556>
- Richard G. Lugar, “Nunn-Lugar: Science Cooperation Essential for Nonproliferation Efforts,” *Science & Diplomacy*, March 2012, <http://www.sciencediplomacy.org/perspective/2012/nunn-lugar>
- Rich Kelly, “The Nunn-Lugar Act: A Wasteful and Dangerous Illusion,” CATO Institute Foreign Policy Briefing, 18 March 1996, <http://www.cato.org/publications/foreign-policy-briefing/nunnlugar-act-wasteful-dangerous-illusion>
- Mary Beth D. Nikitin, “The Nuclear Ban Treaty: An Overview,” Congressional Research Service, 10 July 2017, <https://fas.org/sgp/crs/nuke/IN10731.pdf>
- Matthew Harries, “The Real Problem With a Nuclear Ban Treaty,” Carnegie Endowment for International Peace, 15 March 2017, <http://carnegieendowment.org/2017/03/15/real-problem-with-nuclear-ban-treaty-pub-68286>

14 September

Guest speakers from USG on S&T analysis in the IC

WEEK 5

19 & 21 September

Chemical Weapons – the agents, first use in WWI, non-use in WWII

Required Reading:

- *Deadly Arsenals*, Chapter 4; Appendix C (CWC), sections in state chapters on CW program (Iran, Libya, North Korea, Israel, India, US, France, Russia, China, South Africa)

Browse:

- Federation of American Scientists (FAS) Biological and Chemical Weapons website: <http://www.fas.org/programs/bio/index.html>

Optional Reading:

- OTA, *Technologies Underlying Weapons of Mass Destruction* (Washington, DC: OTA 1993), chapter 2, “Technical Aspects of Chemical Weapon Proliferation,” pp 15-69, <http://www.fas.org/spp/starwars/ota/934404.pdf>

WEEK 6

26 & 28 September

1st EXAM – Tuesday, 26 September

Chemical Weapons
State programs after WWII
CWC

Required Reading (continued from Week 5):

- *Deadly Arsenals*, Chapter 4; Appendix C (CWC), sections in state chapters on CW program (Iran, Libya, North Korea, Israel, India, US, France, Russia, China, South Africa)

Browse:

- Federation of American Scientists (FAS) Biological and Chemical Weapons website: <http://www.fas.org/programs/bio/index.html>

Optional Reading:

- OTA, *Technologies Underlying Weapons of Mass Destruction* (Washington, DC: OTA 1993), chapter 2, “Technical Aspects of Chemical Weapon Proliferation,” pp 15-69, <http://www.fas.org/spp/starwars/ota/934404.pdf>

Interim Grades due at end of Week 6

WEEK 7

3 & 5 October

Chemical Weapons - terrorism

Required Reading:

- *Toxic Terror*, Chapters 1, 5, 6, 9, 11, 12, & 14

WEEK 8

10 & 12 October

Biological Weapons – state programs from Kaffa to Sverdlovsk

Required Reading:

- *Deadly Arsenals, Deadly Arsenals*, sections in state chapters on BW program (Iran, Libya, North Korea, Israel, India, US, France, Russia, China, South Africa)

Optional Reading:

- Ann M. Becker, “Smallpox in Washington’s Army: Strategic Implications of the Disease During the American Revolutionary War,” *The Journal of Military History*, April 2004, pp 381-430;
<http://muse.jhu.edu/journals/jmh/summary/v068/68.2becker.html>

WEEK 9

17 & 19 October

Biological Weapons proliferation & nonproliferation efforts

Political and technical challenges of limiting and verifying biological weapons

Required Reading:

- *Deadly Arsenals*, Appendix B (BWC)

Optional Reading:

- Mark Wheelis and Malcolm Dando “On the Brink: Biodefence, Biotechnology and the Future of Weapons Control,” *The CBW Conventions Bulletin*, December 2008, no 58, pp 3-7, <http://www.fas.harvard.edu/~hsp/bulletin/cbwcb58.pdf>

WEEK 10

24 & 26 October

WMD Destruction Programs

Libya & Syria

Required Reading:

- Sharon Squassoni, Disarming Libya: Weapons of Mass Destruction, Congressional Research Service, 22 September 2006,
<http://www.dtic.mil/dtic/tr/fulltext/u2/a475032.pdf>
- Albert J. Mauroni, “Eliminating Syria’s Chemical Weapons,” U.S. Air Force, Center for Unconventional Weapons Studies, Future Warfare Series. No. 58. June 2017,
<http://www.au.af.mil/au/cpc/pub/pdfs/monographs/58MauroniElimSyriaCW.pdf>
- John Hart, “The Smoking Gun of Non-Compliance,” *CBRNe World*, December 2015, pp 17-20,
http://www.cbrneworld.com/uploads/download_magazines/Syrias_Review_2015.pdf

- M.E. Kosal, “Chemical Weapons Destruction and the Public Response,” in *Towards the Elimination of the Chemical Weapons*, Haru, E. and Thakur, R. eds., UN University Press, Netherlands, 2006, pp 118-149.

WEEK 11

31 October

Biological Weapons – terrorism from Aum Shinrikyo to Amerithrax

Required Reading:

- *Toxic Terror*, Chapters 7, 8, 10, & 13

Optional Reading:

- OTA, *Technologies Underlying Weapons of Mass Destruction* (Washington, DC: OTA 1993), chapter 3, “Technical Aspects of Biological Weapon Proliferation, pp 71-117, <http://www.fas.org/spp/starwars/ota/934405.pdf>

2nd EXAM – Thursday, 2 November

WEEK 12

7 & 9 November

US policy responses to proliferation concerns and the terrorist threat of WMD

Dark Winter & Atlantic Storm table-top exercises

DHS TOPOFF Full-scale exercises

Required Readings:

- FoxNews.com, “Smallpox Attack Exaggerated,” 10 July 2003, <http://www.foxnews.com/story/0,2933,35758,00.html>
- Martin Enserink, “How Devastating Would a Smallpox Attack Really Be?” *Science*, 31 May 2002, vol 296, pp 1592-1595, <http://www.sciencemag.org/cgi/content/summary/296/5573/1592>

Optional Reading:

- Tara O’Toole, Michael Mair, and Thomas Inglesby, “Shining Light on ‘Dark Winter’,” *Clinical Infectious Diseases*, April 2002, vol 34, pp 972-983, <http://www.journals.uchicago.edu/doi/full/10.1086/339909>
- M.I. Meltzer, “Modeling Potential Responses to Smallpox as a Bioterrorist Weapon,” *Emerging Infectious Diseases*, Nov-Dec 2001, vol 7, no 6, <http://www.cdc.gov/ncidod/eid/vol7no6/pdf/meltzer.pdf>
- Ronald Barrett, “Dark Winter and the Spring of 1972: Deflecting the Social Lessons of Smallpox,” *Medical Anthropology*, July 2006, vol 25, no 2, pp171-191,

- Jennifer Brower, Peter Chalk, “The Global Threat of New and Reemerging Infectious Diseases: Reconciling U.S. National Security and Public Health Policy,” 2003, RAND, Santa Monica,
http://www.rand.org/pubs/monograph_reports/MR1602/index.html

WEEK 13

14 & 16 November

Missiles & Delivery Vehicles

DPRK

Space Weapons

Required Readings:

- *Deadly Arsenals*, Chapters 5 & 17
- Congressional Research Service, “Nuclear, Biological, and Chemical Weapons and Missiles: Status and Trends,” updated 20 February 2008,
<http://www.fas.org/sgp/crs/nuke/RL30699.pdf>
- Nick Schwellenbach, “EMptyThreat?” *Bulletin of the Atomic Scientists*, September 2005, vol 61 no 5, pp 50-57, <http://bos.sagepub.com/content/61/5/50.full>
- Op-Ed: Lex Loeb, *Nuclear Weapons May Already Be Obsolete -- New Space Based Weapons of Mass Destruction Are Simpler and Just as Lethal*, 12 January 2012,
<http://tinyjump.com/nuclear-weapons-may-already-be-obsolete-new-space-based-weapons-of-mass-destruction-are-simpler-and-just-as-lethal/>

Browse:

- Federation of American Scientists (FAS) Weapons in Space website:
<http://www.fas.org/programs/ssp/man/spacewpnsmain.html>

Optional Reading:

- OTA, *Technologies Underlying Weapons of Mass Destruction* (Washington, DC: OTA 1993), chapter 5, “The Proliferation of Delivery Systems,” pp 197-255,
<http://www.fas.org/spp/starwars/ota/934407.pdf>
- Electromagnetic Pulse (EMP) Commission Report, 2007,
[http://www.empcommission.org/docs/A2473-EMP Commission-7MB.pdf](http://www.empcommission.org/docs/A2473-EMP%20Commission-7MB.pdf)
- “Electromagnetic Pulse Weapons, Generating Waves of Fear in America for 20 Years,” 9 November 2011, <http://fabiusmaximus.com/2011/11/09/30691/> and references therein

WEEK 14

Thanksgiving Break – No Class

Week 15

28 & 30 November

Future WMD

Emerging technologies: synthetic biology, nanotechnology, and trans-humanism

Required Reading:

- DNI Clapper’s Statement for the Record of the Worldwide Threat Assessment of the US Intelligence Community, 9 February 2016, p. 9 on “Genome Editing,”
https://www.dni.gov/files/documents/SASC_Unclassified_2016_ATA_SFR_FINAL.pdf
- Central Intelligence Agency, Directorate of Intelligence, “The Darker Bioweapons Future,” OTI SF 2003-108, 3 November 2003,
<http://www.fas.org/irp/cia/product/bw1103.pdf>
- Kosal, M.E. “Is Small Scary? Nanotechnology Research in an Age of Terrorism,”
Bulletin of Atomic Scientists, September/October 2004, vol 60, pp 38-47,
www.nanowerk.com/nanotechnology/reports/reportpdf/report55.pdf

Optional Reading:

- Christopher Chyba and Alex Greninger (*who was a political science undergrad at the time he co-authored the article*), “Biotechnology and Bioterrorism: An Unprecedented World,” *Survival*, January 2004, vol 46, pp 143-162,
http://cisac.stanford.edu/publications/biotechnology_and_bioterrorism_an_unprecedented_world/
- James B. Petro, Theodore R. Plasse, and Jack A. McNulty, “Biotechnology: Impact on Biological Warfare and Biodefense,” *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science*, 2003, vol 1, pp 161-168,
<http://online.liebertpub.com/doi/abs/10.1089/153871303769201815>

Week 16

5 December

Review for final exam

FINAL EXAM Friday, 15 December 2:50 – 5:40 PM

One Last Thought

Collaboration, sharing ideas, etc.

“Talk about your ideas. Help your colleagues work out their problems. Pay attention to what other people are doing, and see if you can learn something, or if you can contribute.

“Other than the mundane goal of getting your degree, you are in school to push back the frontiers of knowledge. You do this by generating and exploring new ideas. There is no way that you will ever be able to explore all of the ideas that you generate, but some of those ideas that you discard might be just what some of your colleagues are looking for.

“Human nature tends to make us want to hoard our own ideas. You have to fight against that. Human nature also tends to make us treat other people's ideas with disrespect. The closer the idea to our own area of research, the more likely some part of our brain will try to find fault with it. Fight against that even harder.

“You will find many people in academia who give in to the dark side. These Stealth Researchers never discuss what they are working on, except in vague and deceptive terms. They are experts at finding fault with the work of their colleagues. The Stealth Researcher writes papers that make very grand claims, but you can never quite figure out what they've accomplished and what they haven't. He is a master at omitting the key detail of the design or process that would enable others to follow his work. The Stealth Researcher is a knowledge diode, a roach motel for information. He has replaced the fundamental goal of discovery and publication with the twin evils of ego and empire.

“Be open about what you are working on. Be honest about what you've done, and even more honest about what you haven't. Don't ever hide an idea for fear that someone will steal it, even if you are talking to a Stealth Researcher. With patience, maybe we can cure them.”

Prof Kristofer S.J. Pister

Electrical Engineering and Computer Science

UC Berkeley