



## Course Information



### Objectives

This seminar will address the political issues, as well as the science and technology associated with the proliferation of nuclear, biological, and chemical weapons of mass destruction (WMDs). Participants will study scientific/technical aspects of the production, acquisition, and use of these weapons. They will discuss the external and internal effects of a nation state's acquisition of WMDs including case studies of Iran, North Korea, India, and Pakistan. The history of nonproliferation treaties and their effectiveness will be reviewed. The potential impact of WMDs in the hands of non-nation state (terrorist) organizations will be presented. Finally, participants will examine measures for reducing proliferation of WMDs. It is a writing intensive course.



### Grading Policies

**Short papers (2 or 3 pages each) (30 points)** Briefs on assigned topics prepared before discussion sessions.

**Seminar participation (10 points)** This includes attendance and participation in the discussion sessions.

#### **Paper (50 points total)**

- Outline and preliminary bibliography (10 points)
- Initial draft (10 points)
- Peer review (5 points)
- Final paper (25 points)

**Final presentation (10 points)**



### Avoiding Plagiarism

W&L students frequently express concerns about inadvertently committing plagiarism, described in the *2003-2004 Student Handbook* as "the use of another's words or ideas without proper acknowledgement." The resources listed in this URL should be considered as sources of advice about what constitutes plagiarism and how to avoid it.



### The Citation Machine

Citation Machine is an interactive Web tool designed to assist in modeling the proper use of information property. You merely...

1. Click the type of resource you wish to cite,
2. Complete the Web form that appears with information from your resource, and
3. Click **Make Citations** to generate standard MLA citations.



## Syllabus

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### Syllabus

#### Introduction

**Jan. 4** Current situation - overview - Strong and Settle; Cir., Chapter 1 - Prepare for discussion by responding to discussion board #1, *Plans for a WMD Attack* - Post your response by **6 PM Sunday, Jan. 8.**

**Jan. 9** Discussion of plans for WMD attack

#### Scientific & technical aspects of WMDs Nuclear weapons

**Jan. 11** History of the first weapons project, the Manhattan Project - Settle; Cir., Chapter 3; respond to discussion board #2.

**Jan. 16** Post WW II developments in nuclear weapons - Settle; Norris Nuclear History handout

**Jan. 18** Nuclear terrorism (stolen weapons, INDs, RDDs, and attacks on nuclear facilities)- Settle and Strong

#### Chemical and Biological Weapons

**Jan. 23** Nuclear fuel cycle and reactors; Chemical weapons - Settle; Cir. Chapter 4, Plague Wars, first half; discussion board #3

**Jan. 25** Biological weapons - NOVA film "Bioterror" Settle - Cir., Chapter 4, Goodwin and Philis, all, Plague Wars, last half

**Jan. 30** Discussion - Choose your weapons - discussion board #4

**Feb. 1** Plague Wars discussion - Strong; Delivery Systems - Settle; Cir., Chapter 5

**Feb. 6** NPT- Dr. Strong, Weapons Delivery Systems - Dr Settle; Rehearsing Doomday - CNN video - Cir. Chapter 5, Missile Proliferation and Cir. Appendix A, the Nuclear Nonproliferation Treaty

**Feb. 8** Iranian Forum - Discussion Board #5; **submit topic for approval via Discussion Board #6 (all paper assignments are in blue and should remain unchanged.)**

#### Break

#### Nation sponsored WMD programs Case studies

**Feb. 20** Israel and North Korea - Strong - Cir. Chapters 13 and 14

Feb. 22 No class

Feb. 24 Andrew Semmel, Principal Deputy Assistant Secretary for Nonproliferation, US State Department -

**submit revised paragraph and references for final paper - Discussion Board #6 continued**

Feb. 27 Rehearsing Doomsday - CNN video

Mar. 1 WMD treaties - Dr. Strong - Cir. Chapter 2 and Appendices A - E

Mar. 6 - Ms. Carah Ong, Advocacy and Research Director, Nuclear Age Peace Foundation

**Paper outline with initial bibliography Discussion Board #8 by 8 AM Wednesday, March 8**

March 8 India/Pakistan - Strong - Cir., Chapters 11 & 12;

### **Terrorism**

Mar. 13 Bioterrorism - Dr. Robert Burnett, Professor of International Studies, VMI

Mar. 15 Terrorists and WMD - Dr. Strong

Mar. 20 - **Initial draft of paper due (Three printed copies)**

#### **Student presentations (4)**

1:00 - Sara Mueller

1:20 - Jess Steinmetz

1:40 - Brad Bradenham

2:00 - Philippe Bartholin

Mar. 22 **Review of peer's paper draft due**

1:00 - Debby Newell

1:20 - Chrittina Griesemer

1:40 - Heather Hart

2:00 - Tripp Watson

Mar. 27 **Presentations (4)**

1:00 - Georgia Gilroy

1:20 - Karen Klein

1:40 - Paul Juster

2:00 - Jamie Blake

**Mar. 29** **Class picnic at the Settle's - 6:00 PM**

**Presentations (4) -**

1:00 - James McKay

1:20 - Kevin Pickins

1:40 - Andrew Hotaling

2:00 - Ryan Light

**Mar. 31** **Final paper due by 5 PM**



## Course Documents

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Introduction



Nuclear Weapons



Chemical and Biological Weapons



Weapons Delivery Systems



Treaties for Limiting or Controlling WMD



Current US and Russian Nuclear Forces and War Plans



## [India and Pakistan](#)



## [Terrorism and WMD](#)



## Introduction



### **WMD Concept map**

Concept map is located in L:\Departments\Univ\Univ 203-2006\index



### **[Towards a Safer World \(Mohamed ElBaradei\)](#)**

The short commings of the present nuclear non-proliferation regime are evident. Mohamed ElBaradei, head of the International Atomic Energy Agency and winner of the 2005 Nobel Peace Prize offers his views on how it could be improved.



### **[ElBaradei's Noble Lecture \(12/10/05\)](#)**

Mohamed ElBaradei's Nobel lecture given upon his receiving the Nobel Peace Prize on Decemebr 10, 2005 in Oslo, Norway.



### **[US Strategy to Combat Weapons of Mass Destruction](#)**

The six-page National Strategy to Combat Weapons of Mass Destruction is based on the classified National Security Presidential Directive 17, which President Bush signed in September 2002. That directive is official U.S. policy. This strategy for dealing with weapons of mass destruction rests upon three pillars: counterproliferation, nonproliferation, and WMD consequence management.



### **[Avoiding Armageddon \(PBS\)](#)**

Website that accompanies the four hour PBS program Avoiding Armageddon. Good overview and introduction to WMD topics.



### **Map of WMD 2005**

[DeadlyII.ProlifMap12x10.FINAL\[1\].pdf](#) (1.33 Mb)

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## Nuclear Weapons



### **The Discovery of Nuclear Fission and The Manhattan Project**

Dr. Settle's presentation is located at L:\Departments\Univ\Early History of Nuclear Weapons.



### **Nuclear History and Concepts (Dr. Settle)**

This site presents many of the basic concepts of nuclear energy presented by Dr. Settle. It begins with Chadwick's discovery of the neutron and the rapid elucidation of the decay and fission of the heavy element atoms. From this science comes the realization that the energy produced can be used for weapons - a thought that crystallizes just as world war seems imminent in 1939. Finally, it describes the chemistry of the heavy elements and shows how isolation of uranium isotopes and the discovery and isolation of the synthetic element plutonium led to weapons in the hands of the Allies and ends World War II.



### **Nuclear Weapons History - Part 2**

[Nuclear Weapons Proliferation](#) (2.745 Mb)

Dr. Settle's presentation on the proliferation of nuclear weapons after WW II.



### **The Manhattan Project History**

Published by the United States Department of Energy, this 142 page history of the Manhattan Project is a brief, concise, and technical version of the making of the atomic bomb, presented through the lens of physics. Like many historians, Gosling begins the story with Einstein's letter and the impact it had on President Roosevelt. Part I highlights the discovery of fission and early American work on it. Part II describes early government support for research on isotope separation, and the founding of the National Defense Research Committee under Vannevar Bush. Part III traces the role of the Manhattan Engineering District under the leadership of General Groves, and its choice of paths for bomb development. Part IV, the most extensive section of the book, outlines the Manhattan Project in operation, with detailed descriptions of Hanford's plutonium pile and the gaseous diffusion plant at Oak Ridge. Part V explains the decision to use, and the dropping of the two atomic bombs. Part VI tells of changes in post-war bomb preparation and assembly, and discusses the major postwar legislation on atomic energy including the establishment of the Atomic Energy Commission (AEC).



### **Nuclear History**

[Nuclear History: The Neglected Discipline](#) (248.876 Kb)

This document traces the history of nuclear weapons from their initial development by the United States' Manhattan Project to their acquisition by the big five powers through 1967.



### **Table of Nuclear Weapons Pursuits of the Big Five**

This informative table provides a historical summary of the nuclear weapons programs of the United States, U.S.S.R/Russia, Britain, France, and China. The information (2003) includes number and status of warheads, milestones in weapons development and testing, and the nuclear infrastructure of each country.



### **Nuclear power reactors and proliferation**

[Nuclear Reactor types.ppt](#) (1.99 Mb)

Dr. Settle's presentation on nuclear reactors.



### **Nuclear Fuel Cycle**

Simple explanation of the nuclear fuel cycle.



### **Nuclear Power for the Future**

This article reviews existing types of nuclear reactors and describes the next generation of reactors currently under development. It provides data on current nuclear power generation worldwide, and it projects where new reactors will be located. Issues associated with safety and nuclear waste are discussed. (from Alsos Digital Library for nUclear Issues (<http://alsos.wlu.edu>))



### **Commercial Radioactive Sources: Surveying the Security Risks**

This report is the result of a study which examined the security risks of commercial sources of radiation, determined that security risks do exist, and suggested several ways to lessen those risks. Commercial sources of radiation, according to the study, could potentially be used in radiological dispersal devices (RDD, or 'dirty bombs'). The study notes that only a very small number of worldwide commercial radioactive sources are portable, dispersible, and radioactive enough to be feasible for use in RDDs. Also, although there are loopholes in most countries' export policies, the regulatory controls in the former Soviet Union and developing countries are the weakest. Some of the study's proposals for lessening the security risk are disposal of disused sources; recovery of dangerous lost, abandoned, or stolen radioactive sources; and help for nations in strengthening weak regulatory controls. Appendices include a table of health consequences of radioactive exposure (by element) and a list of reactors known to produce radioisotopes. (from the Alsos Digital Library <http://alsos.wlu.edu>)



### **Table of the nuclides**

Nuclear properties of all the isotopes of all the elements.



### **Nuclear Terror**

[\(1\) Nuclear radiation](#) (459.5 Kb)

[\(2\) Nuclear terrorism](#) (1.435 Mb)

(1) Background material on nuclear radiation (Dr. Settle).

(2) Dr. Settle's presentation of Dr. Charles Ferguson's slides.

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## **Chemical and Biological Weapons**



### **Chemical Weapons**

[Chemical Agents](#) (2.657 Mb)

Dr. Settle's presentation on chemical agents.



### **Biological Weapons**

[Biological and Toxin Agents](#) (1.152 Mb)

Dr. Settle's notes on biological agents.



### **Genetic Science and Weapons of Mass Destruction**

[Presentation](#) (2.253 Mb)

Dr. Robert Burnett's presentation to the class on March 13, 2006.



### **CBW Summary**

[CBW Summary](#) (4.705 Mb)

Breif summary and comparison of Chemical and Biological Weapons



### **The Living Weapon (PBS)**

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[EDIT VIEW](#)



## **Weapons Delivery Systems**



### **Systems**

[Delivery Systems](#) (1.365 Mb)

Dr. Settle's presentation on high end delivery systems.

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[EDIT VIEW](#)



## **Treaties for Limiting or Controlling WMD**



### **WMD Treaties and Agreements**

[WMD Treaties and Agreements](#) (28.5 Kb)

Summary of types of WMD treaties and agreements (Dr. Strong)



### **Texts of WMD treaties**



### **Adherence to and Compliance with Arms Control and Nonproliferation Agreements and Commitments**

This unclassified Report (September 2005) is submitted pursuant to section 403 of the Arms Control and Disarmament Act, as amended, which requires, as part of the United States Department of State Annual Report, a discussion on Adherence to and Compliance with Arms Control Agreements and Nonproliferation Agreements and Commitments.

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## **Current US and Russian Nuclear Forces and War Plans**



### **US Joint Stratqetic Capabilities Plan Nuclear Supplement**

This document outlines the planning process for the development of operational plans to support national security objectives.





### **U. S. Nuclear Forces, 2006**

Current update on the nuclear forces of the United States as of January 2006 from the *Bulletin of the Atomic Scientists*



### **Russian Nuclear Forces 2006**

Current Russian nuclear forces as of January 2006 from the *Bulletin of the Atomic Scientists*.



### **Doctrine for Joint Nuclear Operations**

The March 2005 document provides guidelines for the joint employment of forces in nuclear operations of the United States military. It provides guidance for the employment of US nuclear forces; command and control relationships; and weapons effect considerations.

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## **India and Pakistan**



### **Joint Statement on US India Nuclear Agreement**



### **India Special Weapons Guide**

Materials on India's WMD from the Federation of American Scientists



### **Pakistan Special Weapons Guide**

Materials on Pakistan's WMD from the Federation of American Scientists



### **India - Pakistan Nuclear Issues**

Information on nuclear issues from the Nuclear Control Institute.



### **India's WMD Profile**

Material from the Nuclear Threat Initiative



### **Pakistan's WMD Profile**

Material from the Nuclear Threat Initiative.

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## **Terrorism and WMD**



### **Terrorism: Questions and Answers**

The Council on Foreign Relations website on terrorism.



## External Links

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[Chemical and Biological Warfare](#)



[Chemical Warfare](#)



[Biological Warfare](#)



[Terrorism](#)



[Weapons Delivery Systems](#)



[North Korea](#)



[Treaties and Agreements Involving WMDs](#)



[Cyberterrorism](#)



[Iran](#)



[India/Pakistan](#)



**Manhattan Project**