Course Description
Examine the physical and political consequences of chemical, biological, and nuclear weapons, with emphasis on issues of nuclear deterrence and arms control.

Warning – Graphic Images
The study of WMD includes the study of their effects. As part of this class, we will be examining some graphic photos of WMD casualties — people with burns, blisters, radiation poisoning, and disease. These images are essentially political in character — they are part of the reason that the world treats WMD differently from other weapons. You may wish to preview the lecture slides on Canvas in order to prepare yourself for their appearance in lectures.

Course Overview
This course covers chemical, biological, and nuclear weapons. The effects of each type of attack will be simulated; we will also cover the military doctrine, international law, and politics of each of these weapons. Special emphasis is placed on the uniqueness of nuclear weapons, including nuclear deterrence and nuclear arms control.

Course Outcomes and Learning Objectives
The core objective of this class is to enable students to answer the following central questions about the politics of weapons of mass destruction (WMD). At the end of the course, students should be able to answer each of the following:

1. What are WMD, and in what ways — and why — do international laws and international institutions treat them differently from other weapons?
2. How does the possession of WMD by nations or their adversaries affect the decisions that those nations make, especially those embodied in military doctrine and crisis behavior?
3. When and under what circumstances are WMD likely to be used, and what are the likely consequences of their use?

Learning Objectives: At the end of the course, students should be able to answer question one Learning Objective 1) and each of the remaining two questions about chemical (Learning Objectives 2-3), biological (Learning Objectives 3-4), and nuclear (Learning Objectives 5-6) weapons. These objectives (outcomes) are...
introduced by readings and lectures, reinforced by class participation exercises and homework, and assessed using Assignment 1 (Outcome 1), Assignment 2 (Outcome 5), Assignment 3 (Outcome 6), Assignment 4 (Outcomes 5 and 6), a comparative WMD doctrine research paper (Outcomes 2-6), and the final exam (all outcomes).

Course Format
This course meets face-to-face, with supplemental materials made available online through the Texas A&M-Central Texas Canvas Learning Management System [https://tamuct.instructure.com].

Required Readings
The following books are required for this course. The other required readings are on Canvas. Note that a student is under no obligation to purchase textbooks from the university bookstore. Other sources, including online retailers, may offer lower prices. Do pay careful attention to delivery dates so that you have each book on time. All other required readings and the required films may be found on Canvas.


Technology Requirements
This course will use the Texas A&M-Central Texas Instructure Canvas learning management system. Logon to Texas A&M-Central Texas Canvas [https://tamuct.instructure.com/] or access Canvas through the TAMUCT Online link in myCT [https://tamuct.onecampus.com/]. You will log in through our Microsoft portal.

Username: Your MyCT email address. Password: Your MyCT password
Note that you will also need to use Microsoft Excel to fill in the blanks for Assignment 3. Excel is installed on all of the student-accessible computers on campus.

Canvas Support
Use the Canvas Help link, located at the bottom of the left-hand menu, for issues with Canvas. You can select “Chat with Canvas Support,” submit a support request through “Report a Problem,” or call the Canvas support line: 1-844-757-0953.

Other Technology Support
For log-in problems, students should contact Help Desk Central.
24 hours a day, 7 days a week:
Email: helpdesk@tamu.edu
Phone: (254) 519-5466
Web Chat: [http://hdc.tamu.edu]

Please let the support technician know you are an A&M-Central Texas student.
For issues related to course content and requirements, contact your instructor.

Grading (90/80/70/60):

- **Academic Integrity Exercise (Needed to Pass):** This consists of watching a brief lecture, taking a quiz, seeing where any mistakes on the quiz came from, and signing a statement. Once you successfully complete this exercise, you will no longer need to do so in future political science courses. *If you have already completed this exercise in one of my other courses, you need not do so again for this course.*
***Completing the Academic Integrity Exercise is a prerequisite to passing this course. It must be completed before you hand in the first assignment or the due date on the course calendar, whichever comes first.***

- **Rubric:** You will automatically fail the course if you have not completed the Academic Integrity exercise on or before its due date.

- **Final Exam (30%).** The final exam will have two portions: a short-answer/completion section and an essay question. Each section is worth equal credit. You will be permitted to use your readings and notes on the exam.
  - The final exam consists of 50 short-answer questions and a single essay question.
    - There will be 25 short answer (listing or one-sentence writing) questions drawn from the readings. There will also be 25 drawn from lectures.
    - The essay question (50% of the credit) will be drawn from Questions 1, 2, or 3 on the syllabus and cover one of the following: WMD in general, chemical and biological weapons (CBW), or nuclear weapons. It will be up to you to make relevant distinctions between different subtypes of WMD, where necessary, in your answer.
  - **Rubric:** Both sections are worth equal credit. For the essay question, see the following final exam essay rubric:

### POLI 5365 Final Exam Essay Rubric

<table>
<thead>
<tr>
<th>Grade</th>
<th>Thesis (15%)</th>
<th>Argument Structure (15%)</th>
<th>Evidence from Films, Readings, and Lectures (70%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>A</strong></td>
<td>Answers the question and drives the rest of the essay</td>
<td>The thesis is built up from arguments about each element of the question, each with its own support</td>
<td>Each element of the argument is supported by evidence from the course. In general, consistent statistical findings are better evidence than isolated examples, where such evidence is available. No major source of evidence is ignored (including counter-evidence, which is addressed and shown to be less compelling or more flawed than the evidence supporting the thesis).</td>
</tr>
<tr>
<td><strong>B</strong></td>
<td>Answers the question, but most of the paper ignores it</td>
<td>Some elements of the thesis do not correspond to sections of the answer, or vice versa</td>
<td>Each element of the argument is supported by evidence from the course, but major sources of evidence are ignored. OR The evidence used is insufficient to support one or more of the claims in the paper. OR Much of the support consists of direct quotes or naked claims, unsupported by research.</td>
</tr>
<tr>
<td><strong>C</strong></td>
<td>Does not match up with every element of the question</td>
<td>The essay is a set of arguments that proceed without logical order</td>
<td>The evidence, when taken as a whole, fails to support the paper’s thesis, with necessary steps in the argument being assumed instead of demonstrated. Much relevant evidence is omitted and irrelevant evidence may be present. References to evidence from the course lack specificity.</td>
</tr>
<tr>
<td>Grade</td>
<td>Thesis (15%)</td>
<td>Argument Structure (15%)</td>
<td>Evidence from Films, Readings, and Lectures (70%)</td>
</tr>
<tr>
<td>-------</td>
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</tr>
<tr>
<td>D</td>
<td>Does not match up with most elements of the question</td>
<td>Most of the essay is devoid of actual argument, instead following a &quot;data dump&quot; strategy</td>
<td>At least one major element of the essay’s argument has substantial evidence from the course that supports it. However, other references are generally vague, irrelevant, or refuted by counter-evidence from other studies.</td>
</tr>
<tr>
<td>F</td>
<td>None</td>
<td>The essay is devoid of structure</td>
<td>Little if any evidence from the course is used in the answer. It fails to demonstrate a grasp of what the authors found.</td>
</tr>
</tbody>
</table>

- Individual Homework Assignments (30%). Every take-home assignment in this course should be typed unless the instructions say otherwise. I require a hard copy, not an emailed document, to grade your assignment. In an emergency, email can prove you’ve completed the assignment – but I still need a hard copy to grade.
  - **Regrades:** You have one week from when I return an assignment to request a re-grade of some or all of the exercise. Just attach a note specifying the section you want regraded. I will compare it to the key again.
- In-Class Work (20%). From time to time, we will have a small- or large-group exercise in class (discussion exercises, debates, or worksheets). I do not ordinarily announce these in advance. Each one is worth equal credit. You will receive 100% credit if you are there and participate throughout the exercise. However, if it becomes clear that you aren’t doing your part, then your credit will be greatly reduced.
  - **Late Arrivals:** If you miss part of an in-class assignment, I will reduce your participation credit. While I ordinarily make a reduction in proportion to the amount you missed, I may reduce credit even further if, in my judgment, the portion you missed was more important than the remainder of the exercise.
- Comparative WMD Doctrine Paper: This is a modest research paper that combines historical research with political science. Select a country other than the United States that has a chemical, biological, or nuclear weapons program. Research and write a 3000-10,000 word analytical history of the program, noting all substantial changes in doctrine that have occurred and using your research to compare the relative merits of the realist/rational choice, organizational theory, and strategic culture explanations for how doctrines evolve over time (an overview can be found in the Sagan 2000 chapter on Canvas). It would be unusual to use fewer than five academic sources (books from academic publishers and/or peer-reviewed journal articles), in addition to any relevant assigned readings – you would need to hand in a justification of this apparent shortfall along with the paper. Use APSA’s citation system (available under Writing Resources on Canvas), including a properly-formatted works cited page.
POLI 5365 Course Rubric

<table>
<thead>
<tr>
<th>Item</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Academic Integrity Exercise</td>
<td>0 (but required to pass the course)</td>
</tr>
<tr>
<td>Assignment 1 (BWC Report)</td>
<td>50</td>
</tr>
<tr>
<td>Assignment 2 (Evolution of US Nuclear Doctrine)</td>
<td>100</td>
</tr>
<tr>
<td>Assignment 3 (India-Pakistan Deterrence)</td>
<td>50</td>
</tr>
<tr>
<td>Assignment 4 (Nuclear Risk Analysis)</td>
<td>100</td>
</tr>
<tr>
<td>Comparative WMD Doctrine Paper</td>
<td>200</td>
</tr>
<tr>
<td>Final Exam</td>
<td>300</td>
</tr>
<tr>
<td>Participation Exercises</td>
<td>200 (divided evenly between exercises)</td>
</tr>
<tr>
<td>TOTAL POSSIBLE</td>
<td>1000</td>
</tr>
</tbody>
</table>

895+ = A        795-894=B         695-794=C         595-694=D        594 or lower = F

Attendance

Attendance is required. While attendance as such is not a component of the final grade, it is exceedingly difficult to do well without a good set of lecture notes – and the PowerPoint files I post online don’t include the explanations I give in class. Furthermore, it is rather challenging to complete in-class work when one is not in the classroom.

Beware! The lectures do not simply rehash the readings – they add new material and help you organize the evidence presented in the assigned readings. The “downside” to this is that you need both a good set of lecture notes and careful examination of the assigned readings to do well in the course. The upside is that lectures are actually worth attending, and if you email me questions about the readings I’ll address them in class.

Excused Absences, Make-Up Work, and Late Work

- Barring some emergency, students must inform the instructor prior to an absence. Send me an email stating the dates(s) you will be missing and the reason(s). You should also hand me a written note with this information in class. (Protect yourself! Don’t rely on my memory – hand me something written that I can keep in my files). Failure to contact the instructor prior to class will normally rule out any sort of make-up. Make-up exams differ from the original and are offered at the instructor’s convenience.
- Make-up work is required for each excused absence. This consists of a 3-4 page typed outline of the major points and arguments from the readings/films for the week. You must also complete any in-class exercises you missed.

Incompletes

Grades of incomplete are not to be used when students simply fall behind. Instead, they are used when some event such as a hospitalization or deployment effectively takes the student out of the class after the drop deadline. By university policy, incompletes must be finished in the subsequent semester.

Academic Integrity

University Code of Academic Honesty: Texas A&M University -Central Texas values the integrity of the academic enterprise and strives for the highest standards of academic conduct. A&M-Central Texas expects its students, faculty, and staff to support the adherence to high standards of personal and scholarly conduct to preserve the honor and integrity of the creative community. Academic integrity is defined as a commitment to
honesty, trust, fairness, respect, and responsibility. Any deviation by students from this expectation may result in a failing grade for the assignment and potentially a failing grade for the course. Academic misconduct is any act that improperly affects a true and honest evaluation of a student’s academic performance and includes, but is not limited to, cheating on an examination or other academic work, plagiarism and improper citation of sources, using another student’s work, collusion, and the abuse of resource materials. All academic misconduct concerns will be reported to the university’s Office of Student Conduct. Ignorance of the university’s standards and expectations is never an excuse to act with a lack of integrity. When in doubt on collaboration, citation, or any issue, please contact your instructor before taking a course of action.

More information regarding the Student Conduct process is available at the following link: [https://tamuct.campuslabs.com/engage/organization/tamuct-student-conduct-panel]. If you know of potential honor violations by other students, you may submit a report, [https://cm.maxient.com/reportingform.php?TAMUCentralTexas&layout_id=0].

Specific guidelines for this course, which supplement and do not replace University policy:

- **Violations:** There are plenty of ways to cheat listed by the Student Handbook. Some common violations of academic integrity that I have observed while teaching similar classes at TAMUCT are
  - **Most Common Violation:** Plagiarism. This comes in two varieties:
    - Use of direct quotes without quotation marks. Even if you are just using three- or four-word phrases, you need to surround them with quotation marks if you didn’t create them yourself. This is true even if you cite the source! Remember that changing a few words in a sentence does not transform a direct quote into a paraphrase; instead, it transforms one long direct quote into several shorter direct quotes with a word of your own between each. A true paraphrase is the expression of the cited source’s ideas in your own words.
    - Paraphrasing another person’s words without citing the source
  - **Second Most Common Violation:** Receiving answers on any coursework from anyone other than the instructor. If you hand your work to someone else and they proceed to copy part or all of it, both of you will be deemed to have violated the policy. A single copied answer on an assignment is sufficient to trigger the policy.

- **Penalties:**
  - The normal penalty for a violation of academic integrity (whether or not it is specifically listed above) in any of my classes is a grade of zero for the work or a deduction of 20% (two letter grades) from your course grade, whichever is greater. The infraction will be reported to the TAMUCT administration, with a recommendation for probation in the case of deliberate violation or no further action in the case of clearly inadvertent violation.
  - The (a) outright purchase, download, or completion by others of an exam or assignment, or (b) second or subsequent violation of academic integrity (in this course or other courses) display such serious disregard for academic integrity that either one of them will result in course failure and recommendation for maximum disciplinary penalties to the TAMUCT administration.

**Drop Policy**
If you discover that you need to drop this class, you must complete a [Drop Request Form](https://www.tamuct.edu/registrar/docs/Drop_Request_Form.pdf).

Professors cannot drop students; this is always the responsibility of the student. The Registrar’s Office will provide a deadline on the Academic Calendar for which the form must be completed, signed and returned. Once you return the signed form to the Registrar’s Office, you must go into Warrior Web and confirm that you
are no longer enrolled. If you still show as enrolled, FOLLOW-UP with the Registrar’s Office immediately. You are to attend class until the procedure is complete to avoid penalty for absence. Should you miss the drop deadline or fail to follow the procedure, you will receive an F in the course, which may affect your financial aid and/or VA educational benefits.

Student Resources

- **911 Cellular**: 911Cellular is an emergency notification service that gives Texas A&M University-Central Texas the ability to communicate health and safety emergency information quickly via email, text message, and social media. All students are automatically enrolled in 911Cellular through their myCT email account.
  - In an effort to enhance personal safety on the Texas A&M University – Central Texas (TAMUCT) campus, the TAMUCT Police Department has introduced Warrior Shield by 911 Cellular. [Warrior Shield](https://www.tamuct.edu/police/911cellular.html) can be downloaded and installed on your mobile device from Google Play or Apple Store.
  - Connect at [911Cellular](https://portal.publicsafetycloud.net/Texas-AM-Central/alert-management) to change where you receive your alerts or to opt out. By staying enrolled in 911Cellular, university officials can quickly pass on safety-related information, regardless of your location.

- **Academic Accommodations**: At Texas A&M University-Central Texas, we value an inclusive learning environment where every student has an equal chance to succeed and has the right to a barrier-free education. The Office of Access and Inclusion is responsible for ensuring that students with a disability receive equal access to the university’s programs, services and activities. If you believe you have a disability requiring reasonable accommodations please contact the Office of Access and Inclusion, WH-212; or call (254) 501-5836. Any information you provide is private and confidential and will be treated as such. For more information please visit our [Access & Inclusion](https://www.tamuct.edu/student-affairs/access-inclusion.html) web page:
  - Texas A&M University-Central Texas supports students who are pregnant and/or parenting. In accordance with requirements of Title IX and guidance from US Department of Education’s Office of Civil Rights, the Dean of Student Affairs’ Office can assist students who are pregnant and/or parenting in seeking accommodations related to pregnancy and/or parenting. For more information, please visit [Title IX Coordinator](http://www2.ed.gov/about/offices/list/ocr/docs/pregnancy.pdf). Students may also contact the institution’s Title IX Coordinator. If you would like to read more about these requirements and guidelines online, please visit the [Student Affairs](https://www.tamuct.edu/student-affairs/index.html) web page [https://www.tamuct.edu/student-affairs/index.html]. Students may also contact the institution’s Title IX Coordinator. If you would like to read more about these requirements and guidelines online, please visit the website [http://www2.ed.gov/about/offices/list/ocr/docs/pregnancy.pdf].
  - Texas A&M University-Central Texas supports students who are pregnant and/or parenting. In accordance with requirements of Title IX and related guidance from US Department of Education’s Office of Civil Rights, the Dean of Student Affairs’ Office can assist students who are pregnant and/or parenting in seeking accommodations related to pregnancy and/or parenting. Students should seek out assistance as early in the pregnancy as possible. For more information, please visit the [Student Affairs](https://www.tamuct.edu/student-affairs/index.html) web page [https://www.tamuct.edu/student-affairs/index.html]. Students may also contact the institution’s Title IX Coordinator. If you would like to read more about these requirements and guidelines online, please visit the website [http://www2.ed.gov/about/offices/list/ocr/docs/pregnancy.pdf].
  - Title IX of the Education Amendments Act of 1972 prohibits discrimination on the basis of sex and gender—including pregnancy, parenting, and all related conditions. A&M-Central Texas is able to provide flexible and individualized reasonable accommodation to pregnant and parenting students. All pregnant and parenting students should contact the Associate Dean in
the Division of Student Affairs at (254) 501-5909 to seek out assistance. Students may also contact the University’s Title IX Coordinator.

- **Tutoring:** Tutoring is available to all A&M-Central Texas students, both on-campus and online. Subjects tutored on campus include Accounting, Advanced Math, Biology, Finance, Statistics, Mathematics, and Study Skills. Tutors are available at the Tutoring Center in Warrior Hall, Suite 111.
  - If you have a question regarding tutor schedules, need to schedule a tutoring session, are interested in becoming a tutor, or have any other question, contact Academic Support Programs at (254) 519-5796, or by emailing Dr. DeEadra Albert-Green at deeadra.albertgreen@tamuct.edu.
  - Chat live with a tutor 24/7 for almost any subject from on your computer! Tutor.com is an online tutoring platform that enables A&M-Central Texas students to log in and receive FREE online tutoring and writing support. This tool provides tutoring in over 40 subject areas. Access Tutor.com through Canvas.

- **University Writing Center:** Located in Warrior Hall 416, the University Writing Center (UWC) at Texas A&M University—Central Texas (TAMUCT) is a free workspace open to all TAMUCT students from 10:00 a.m.-5:00 p.m. Monday thru Thursday with satellite hours in the University Library Monday thru Thursday from 6:00-9:00 p.m. This semester, the UWC is also offering online only hours from 12:00-3:00 p.m. on Saturdays.
  - Tutors are prepared to help writers of all levels and abilities at any stage of the writing process. While tutors will not write, edit, or grade papers, they will assist students in developing more effective composing practices. By providing a practice audience for students’ ideas and writing, our tutors highlight the ways in which they read and interpret students’ texts, offering guidance and support throughout the various stages of the writing process. In addition, students may work independently in the UWC by checking out a laptop that runs the Microsoft Office suite and connects to WIFI, or by consulting our resources on writing, including all of the relevant style guides. Whether you need help brainstorming ideas, organizing an essay, proofreading, understanding proper citation practices, or just want a quiet place to work, the UWC is here to help!
  - Students may arrange a one-on-one session with a trained and experienced writing tutor by visiting the UWC during normal operating hours (both half-hour and hour sessions are available) or by making an appointment via WCOnline. In addition, you can email Dr. Bruce Bowles Jr. at bruce.bowles@tamuct.edu if you have any questions about the UWC and/or need any assistance with scheduling.

- **University Library:** The University Library provides many services in support of research across campus and at a distance. We offer over 200 electronic databases containing approximately 250,000 eBooks and 82,000 journals, in addition to the 85,000 items in our print collection, which can be mailed to students who live more than 50 miles from campus. Research guides for each subject taught at A&M-Central Texas are available through our website to help students navigate these resources. On campus, the library offers technology including cameras, laptops, microphones, webcams, and digital sound recorders.
  - Research assistance from a librarian is also available 24 hours a day through our online chat service, and at the reference desk when the library is open. Research sessions can be scheduled for more comprehensive assistance, and may take place on Skype or in-person at the library. Assistance may cover many topics, including how to find articles in peer-reviewed journals, how to cite resources, and how to piece together research for written assignments.
  - Our 27,000-square-foot facility on the A&M-Central Texas main campus includes student lounges, private study rooms, group work spaces, computer labs, family areas suitable for all
ages, and many other features. Services such as interlibrary loan, TexShare, binding, and laminating are available. The library frequently offers workshops, tours, readings, and other events. For more information, please visit our Library website [http://tamuct.libguides.com/index].

Amendments
Not all exigencies can be foreseen. I reserve the right to amend the syllabus at any time. Any such amendment will be provided to the students in writing.
<table>
<thead>
<tr>
<th>Dates</th>
<th>Topic</th>
<th>Assigned Readings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Jan 16</td>
<td>Politics of &quot;WMD&quot;</td>
<td>None</td>
</tr>
<tr>
<td>Jan 23</td>
<td>Chemical Weapons</td>
<td>Salem, Ternay, and Smart, “Brief History and Use of Chemical Warfare Agents in Warfare and Terrorism”&lt;br&gt;Tucker, “The ‘Yellow Rain’ Controversy: Lessons for Arms Control Compliance”</td>
</tr>
<tr>
<td>Feb 13</td>
<td>BW Proliferation and the BWC</td>
<td>Koblentz, Living Weapons, Chapters 2 and 4&lt;br&gt;Sims, “A Simple Treaty, A Complex Fulfillment”&lt;br&gt;Moodie, “In Good Health?”</td>
</tr>
<tr>
<td>Feb 20</td>
<td>Bioterrorism</td>
<td>Koblentz, Living Weapons, Chapter 5 and Conclusion&lt;br&gt;O’Toole, “Smallpox: An Attack Scenario”</td>
</tr>
<tr>
<td>Feb 27</td>
<td>Physics and Biology of Nuclear Weapons (ONLINE ONLY – No Physical Class)</td>
<td>Watch (On Canvas): Nuclear Weapons -- Physics and Biology&lt;br&gt;Medical Consequences of Nuclear War (Extracts on Canvas)&lt;br&gt;Eden, “City on Fire”&lt;br&gt;Watch (On Canvas): The Day After (Edited for Class) (54 min) or The Day After (Full Version) (122 min)&lt;br&gt;Overpeck,”’Remember! It's Only a Movie!’ Expectations and Receptions of The Day After (1983)”</td>
</tr>
<tr>
<td>Mar 13</td>
<td>NO CLASS</td>
<td>NONE: SPRING BREAK</td>
</tr>
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</table>

**Academic Integrity Exercise Due**

**Assignment 1 Due**

**Assignment 2 Due**
<table>
<thead>
<tr>
<th>Dates</th>
<th>Topic</th>
<th>Assigned Readings</th>
</tr>
</thead>
</table>
| Mar 27   | Comparative Nuclear Doctrine               | • Morgan, “Nuclear Strategy”  
• Rosenbaum, “The Letter of Last Resort”  
• Long, "Russian Nuclear Forces and Prospects for Arms Control”  
• Manzo and Warden, “After Nuclear First Use, What?” |
| Apr 3    | Nuclear Deterrence                          | • Kroenig, The Logic of American Nuclear Strategy, Introduction and Chapters 1-2  
**Comparative WMD Doctrine Paper Due** |
| Apr 10   | Nuclear Crises and the Command of Nuclear Forces | • Danilovic and Clare, “Deterrence and Crisis Bargaining”  
• Kroenig, The Logic of American Nuclear Strategy, Chapters 3-5  
**Comparative WMD Doctrine Paper Due** |
| Apr 17   | Nuclear Proliferation                       | • Hymans, “Nuclear Proliferation and Non-Proliferation”  
• Kroenig, The Logic of American Nuclear Strategy, Chapter 8  
**Assignment 3 Due** |
| Apr 24   | The India-Pakistan Case                     | • Montgomery and Edelman, “Rethinking Stability in South Asia: India, Pakistan, and the Competition for Escalation Dominance”  
• Sundaram and Ramana, “India and the Policy of No First Use of Nuclear Weapons”  
**Assignment 3 Due** |
| May 1    | Nuclear Weapons in International Politics   | • Boyd, “Revealed Preference and the Minimum Requirements of Nuclear Deterrence”  
• Kroenig, The Logic of American Nuclear Strategy, Chapters 6-7, 9, and Conclusion  
• Kristensen and Norris, “Russian Nuclear Forces, 2018”  
**Assignment 4 Due** |
| May 8    | FINAL EXAM                                  | Review All                                                                        |
This exercise is intended to prepare you for an in-class simulation of the Ninth Review Conference of the BWC in 2021. Your task is to represent a country in these talks and secure for your country a better security environment and/or better public health than it currently enjoys. Instructions:

1. Read the assigned material for February 13, especially Sims and Moodie on the BWC.
2. If you have not been assigned a question yet, email me. Write the question number here: ______
3. Read the linked chapter/article about your question (see Canvas under Assignment Resources).
4. Type a two-page memo with about one page answering the question you were assigned (which may require additional research – see #5 below) and another page detailing what the agenda for the BWC’s Ninth Review Conference should be.
5. You will probably have to do some additional research to answer the question. Critically examine a source before using it. For example, http://www.jewishvirtuallibrary.org/jsource/Threats_to_Israel/Syria.html is probably a biased source about Syria. Even the URL suggests the possibility, since Syria and Israel are rivals. It can be difficult to find unbiased information, but it’s out there. The library has many resources that can help you on this assignment. Go to its web page and see the link to the online databases. Academic Search Complete is probably the best index for this exercise. For example, it links to the Bulletin of the Atomic Scientists and Nonproliferation Review which have recent (and quite readable) articles about proliferation around the globe.

- Be sure your first page has a thesis statement – a clear answer to the question which you will then defend. Put your thesis statement in boldface/underline/italics for the benefit of the reader (other members of your “country” in the simulation).
- Cite your sources, including any material used from the assigned readings. Attach a separate sheet for this. APSA format is required (see Canvas for Writing Resources).

<table>
<thead>
<tr>
<th>#</th>
<th>Country</th>
<th>Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>USA</td>
<td>Why does the US oppose adding a system of inspections to the BWC?</td>
</tr>
<tr>
<td>2</td>
<td>RUSSIA</td>
<td>What is Russia’s position on the addition of an inspection scheme to the BWC?</td>
</tr>
<tr>
<td>3</td>
<td>PRC</td>
<td>What is China’s position on the addition of an inspection scheme to the BWC?</td>
</tr>
<tr>
<td>4</td>
<td>USA</td>
<td>Would the US support expanding Article X of the BWC to include formal guarantees of peaceful biotechnology assistance?</td>
</tr>
<tr>
<td>5</td>
<td>RUSSIA</td>
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Overview
If we want to understand the risk of nuclear war, one place to begin is by examining changes in nuclear doctrines over time. Goldblat (2002) writes, “Military doctrines describe the conditions under which force may be used and provide general guidelines for the structuring of armed forces. Nuclear doctrines define the role of nuclear weapons in both deterring and waging nuclear war. ...[T]hese doctrines largely determine the decisions of policy makers with regard to the acquisition, deployment, targeting, and use of nuclear weapons” (69).

Directions
Type a brief essay on the evolution of US nuclear doctrine and its implications by following the steps below. Please double-space your essay, and be sure to cite any sources used, even assigned course readings. Try to avoid direct quotes in favor of genuine paraphrase or explanation of what an author’s analysis means.

A. Historically, what factors have caused changes in American nuclear doctrine? To determine this, undertake the following steps.
   1. List from five to eight changes in US nuclear doctrine discussed in the assigned readings for March 6 and March 20.
   2. For each, answer the simple question, “Why?” That is, what caused each change in nuclear doctrine?
   3. Follow your analysis with a paragraph that summarizes the common factors that seem to have determined these changes in American nuclear doctrine.

B. Conclude with a final paragraph extrapolating these factors to new nuclear nations like Israel, India, Pakistan, North Korea, and perhaps one day Iran. Do you think new nuclear powers’ doctrines will be shaped by the same factors as American nuclear doctrine – which may imply they can be deterred from offensive nuclear use – or are different factors required to explain the policies that will be adopted by these countries?

C. Finally, write an introduction to the paper that lists the changes you’ll be addressing and that provides your thesis about what factors shaped American nuclear doctrine from the early 1940s to the present.
Overview

Your job in this assignment is to evaluate the stability of India-Pakistan nuclear deterrence. Nuclear deterrence is generally thought to require a secure second-strike capability by each side. That is, even after absorbing a surprise attack by the other side, each country must be able to inflict unacceptable damage to its opponent. India has always enjoyed second-strike capability because most of Pakistan’s weapons cannot reach far parts of India. This means that simply by storing its weapons some distance from the border, India can protect itself for the next ten years or more. Pakistan, on the other hand, is entirely within range of most Indian air forces. This vulnerability has led it to rush forward with the production and testing of ballistic missiles capable of reaching distant targets in India, even if the Pakistani air force is destroyed on the ground. But has it really succeeded in building a viable second-strike force? Given these facts, the primary threat to strategic stability (from the perspective of rational deterrence theory) is the danger that India could destroy Pakistan’s ability to retaliate (second-strike capability) in a nuclear first strike. We will use this exercise as the basis for one or more in-class exercises.

Instructions

I. Read Deadly Arsenals, Chapter 12 to understand Pakistan’s nuclear forces. The reading is on Canvas. The map and tables in the chapter are especially useful for this exercise.

II. Simulate an Indian first strike on Pakistan, given both strategic and tactical surprise. This is the best-case scenario for a nuclear war from India’s standpoint, and a worst-case scenario for Pakistan’s military planners.

A. Preliminary Information:

1. Assume that India has actually assembled about 75 nuclear weapons in secret and forward-deployed its bombs and aircraft to bases near the border. However, India has not yet miniaturized its warheads to enable them to be launched on ballistic missiles. This is consistent with what we know about Indian capabilities – while they have plenty of nuclear weapons, they are actually behind Pakistan (which traded know-how with North Korea) when it comes to deploying nuclear-tipped missiles.

2. Available delivery systems: You are limited to India’s fleet of nuclear-capable aircraft: Mirage 2000 (best), MiG 27, MiG 29, and Su-30. Assume that each aircraft can only carry one nuclear weapon. For an estimate of how many of each aircraft India possesses, see http://en.wikipedia.org/wiki/List_of_active_Indian_military_aircraft (link on Canvas).

B. Strategic Objectives: Assume that Pakistan has at least a few road-mobile nuclear-tipped missiles. However, unless a crisis occurs, these are probably kept in hardened storage facilities to prevent theft or destruction of the weapons by domestic insurgents. Accordingly, to eliminate the Pakistani nuclear threat, India will have to

1. Destroy the two known locations of road-mobile missiles: Sargodha (a hardened facility on the map in Deadly Arsenals) and Fatehjang (a “soft” facility 25 miles southwest of Rawalpindi on your map). See C below for a description of hard and soft targets.

2. Destroy Pakistan’s nuclear-capable aircraft before they can be armed with nuclear weapons and depart their airfields. Assume that all of the aircraft listed in Deadly Arsenals, Chapter 12 are potential Pakistani nuclear weapon delivery systems. Go to http://www.fas.org/nuke/guide/pakistan/facility/airbase/index.html for a list of Pakistan’s airfields. You need to destroy those that may accommodate Pakistan’s nuclear-capable
aircraft. Your goal is destruction of all MOBs and FOBs; additional security is provided by destroying all satellite airfields.

3. Destroy Pakistan’s ability to retaliate over the long term by targeting its nuclear weapons and nuclear facilities. You need not hit its research reactors and test sites, but you should destroy the rest of the facilities listed at the end of Chapter 12 in Deadly Arsenals.

C. Tactical Overview: In order to understand how nuclear attacks are planned – a key aspect of whether deterrence can be stable – you must understand how nuclear weapons destroy targets. “Soft” targets are unreinforced and unarmored, like people and their houses. They are easy to kill. “Hard” targets, on the other hand, are heavily reinforced. In order to determine the number and strength of Indian nuclear weapons required to destroy a given Pakistani target, you should understand how to calculate a “kill probability” for a given combination of weapon, delivery system, and target. Most of the following information is taken from David W. Hafemeister, Physics of Societal Issues: Calculations on National Security, Environment, and Energy, 2007:

The general formula for a single-shot kill using a nuclear blast incorporates four central variables:

- A constant term derived from tests of nuclear weapons’ destructive power. This describes how much nuclear explosive power is required to generate a shock wave of a given strength. For our purposes, it is about .22, and already incorporated in the equation below. This assumes a surface or near-surface burst, because these produce the strongest shock waves near the point of detonation.

- The overpressure (strength of shock wave) required to destroy the target – in other words – its “hardness.” This is usually measured in pounds per square inch (psi). It only takes about 0.25 psi to shatter glass – this is roughly the equivalent of hurricane-force winds. Trailers are destroyed at 1 psi. Unreinforced masonry and brick walls crumble at 1.5 psi (tornado-strength winds); if reinforced with steel, they last until 2.5 psi, when all but the steel frame is destroyed. Some of today’s hardened missile and aircraft shelters are built from extremely strong reinforced concrete and partially buried underground. These can require up to 150 psi to destroy.

- Yield of the nuclear weapon, in megatons.

- The accuracy of the nuclear weapon (how far it lands from its target), in nautical miles (one nautical mile = 6076 feet). This is given as CEP, or circular-error-probable. A weapon is equally likely to land anywhere within the CEP. In World War II, most high-altitude bombers had a CEP of about one mile, while low-level bombing managed to improve this to about 1600 feet (0.26 nautical miles). By Vietnam, the US was able to achieve a CEP of 750 feet (0.12 nautical miles) using fighter-bomber aircraft. By the end of the war, unguided bombs were being delivered with a precision of about 365 feet (.06 nautical miles), although this required dangerous, low-level attacks.

Using these factors, we can calculate the single-shot kill probability (SSKP) for an attack on a target using a single nuclear weapon (copied from Hafemeister, p.38):

$$SSKP = 1 - \exp(-Y^{2/3}/0.22H^{2/3}CEP^2),$$

where $Y$ is in megaton, $H$ is in psi, and $CEP$ is in nautical miles (1860 m).

Of course, all of this assumes that the nuclear weapon actually reaches the target area and functions as intended. There is always some probability that a bomb fails to detonate, or that the bomber or missile carrying it fails to make it to the target area. Missiles can misfire or even be shot down. Of course, bombers are extremely vulnerable to defending fighters and surface-to-air
missiles (SAMs). In order to be more realistic, one more variable is needed to represent the reliability of the weapon/delivery system combination. The kill probability of a single attack is therefore:

\[ PK = R \text{ (SSKP)} \]

where \( R \) is the reliability of the attack system (between 0 and 1). If there are multiple attacks, one simply uses the laws of probability to determine the chance that at least one of them destroys the target. So the joint probability of destroying a target with \( N \) attacks is

\[ PK_{\text{joint}} = 1 - \prod_{i=1}^{N} [1 - PK_N] \]

**Fortunately, I have an Excel file that does all the math for you.** You only need to enter the reliability (between 0 and 1), yield of the weapon (in kilotons – Excel will convert it to megatons in the equation), its accuracy (in nautical miles), and the hardness of the target (in psi). If you would like to use two attacks instead of one, simply enter this information for the second strike as well, and the Excel file will tell you the probability that attack 1 destroys the target, the probability that attack 2 destroys the target, and the joint probability that the target is destroyed by the two attacks. You shouldn’t need more than two attacks to destroy a target, but if you want to calculate the joint probability that three attacks destroy a target, just plug in the data for the third attack on the next row and manually compute

\[ 1 - [(1 – \text{joint kill probability of first two attacks}) \times (1 – \text{kill probability of third attack})] \]

The same principle holds if you want to use four attacks. You can use two rows and manually compute

\[ 1 - [(1 – \text{joint kill probability of first/second attacks}) \times (1 – \text{joint kill probability of third/fourth attacks})] \]

D. Download the Excel file from the course website and use it to create a table of targets and how you intend to destroy them. For most targets, success requires a 95% chance of destruction. For Sargodha and the MOBs, higher certainty is required – these must be destroyed with 98% probability. For each target, list the aircraft used and the number and size of warheads needed to gain 95% (or 98%) confidence that the target is destroyed – **this refers to PK (1) if you use one weapon and PK (joint) if you use 2 weapons.** For more weapons, see the formulas above.

1. Assume that India’s nuclear arsenal contains the following weapons:
   a. 5 thermonuclear devices (150 kilotons each)
   b. 5 boosted-fission devices (50 kilotons each)
   c. 10 large fission devices (35 kilotons each)
   d. 20 moderate fission devices (20 kilotons each)
   e. 25 small fission devices (10 kilotons each)
   f. 10 tactical fission weapons (1 kiloton each)
2. A circular-error-probable (CEP, or accuracy) of about 500 feet (.08 nm) is well within the capability of India’s delivery aircraft. However, for weapons larger than 20 kilotons, the pilot will have to release at a higher altitude in order to escape the blast. This reduces accuracy as follows:
   a. 1-35 kilotons: CEP = 500 feet (.08 nm)
   b. 50 kilotons: CEP = 650 feet (.11 nm)
   c. 150 kilotons: CEP = 800 feet (.13 nm)
3. The reliability of the weapon is open to question. Essentially, reliability measures whether the aircraft makes it to the target and releases a bomb. So any aircraft shot down are
considered “unreliable.” The data here are largely speculative, since it has been 30 years since Indian aircraft engaged targets in Pakistan. In previous conflicts, the Indians lost about one aircraft for every hundred sorties. This suggests .99 reliability. However, an Indian study in the early 1980s concluded that about half the attacking bombers would be shot down if India bombed the Kahuta reactor using conventional weapons (a reliability of .5). Given a surprise attack across the whole of Pakistan, however, an optimistic assumption would be that reliability = .98

The hardness of the target varies. Exposed aircraft, even small fighters, are destroyed at overpressures of 3 psi, so you can enter a hardness of 3 for FOB and satellite airfields. However, the MOB airfields probably have hardened shelters for at least some nuclear-capable aircraft, as does the missile facility at Sargodha. In these cases, a hardness of 150 psi should be used. Finally, nuclear facilities are likely to be effectively destroyed by overpressures of only 5 psi (some structures will remain, but most will be too heavily damaged to be usable).

III. Evaluate the results of the first strike.
A. Using a red pen or pencil, mark each strike on the attached map of Pakistan (you must use this map, since it needs to fit an overlay we’ll be using in class). Note: The web site listing Pakistan’s air bases also has a map showing their locations. Deadly Arsenals has a map showing locations of nuclear facilities. Use the following symbols, which will make our in-class exercise easier. For strikes using multiple weapons, add the kt together and use the symbol for the nearest yield.
   1. Strikes on “hard targets” (MOBs and missile shelters) – these weapons will be ground-bursts, creating copious quantities of fallout:
      150 kt or greater = ⡱, 50 kt-149 kt =○, 35 kt or lower = ⌂
   2. Strikes on “soft targets” (all others) – these weapons will be airbursts, killing more people but creating little fallout: ₐ (for all)

   Does India have the capability for attaining a 95%/98% chance of destroying each target? Anything less than a nuclear weapon is unlikely to offer complete assurance of destruction. So you are limited to the number of nuclear weapons in India’s possession. Were you able to destroy all threats? If not, which threats would require follow-up with conventional weapons?

B. How many nuclear weapons does India have left after conducting its first strike?

C. Take a look at your map. Which cities, if any, are so close to your targets that you would have destroyed them as well?

D. How much warning would Pakistan have of the attack? Find the farthest target from the Indian border and compute the time needed for an aircraft moving at about 1200 mph to reach the target (hint: multiply distance in miles by .05 to get the number of minutes to reach the target). Given this warning, would Pakistan have time to assemble its nuclear weapons, load them on its aircraft, and get the aircraft off the runway and away from the blast zone? Would it have time to drive its mobile missiles out of their shelters and fire them?

IV. Evaluate the stability of India-Pakistan deterrence
A. If you were Pakistan, would you feel secure from nuclear attack under the current conditions?

B. List at least three steps that Pakistan could take to increase its odds of maintaining a second-strike retaliatory capability. Hint: Your suggested measures should have one or more of the following consequences: decrease reliability of Indian aircraft, increase hardness of Pakistani targets, increase the number of Pakistani targets, decrease the reliance of Pakistan on aircraft to deliver bombs, increase the odds that Pakistani aircraft could escape destruction in the minutes between the detection of an Indian attack and the Indian nuclear strikes.
C. To what extent would implementing the measures you just suggested convince India that Pakistan was actually preparing a first strike against India? That is, are your defensive measures likely to be viewed as offensive?

D. Would your changes increase the probability of crisis escalation, unauthorized use, or accidental launch?

V. Turn in:
   A. Your completed Excel spreadsheet, printed in landscape orientation so the cells fit on one page width.
   B. Your map with targets marked. Again, use the attached one. We’ll be using overlays in class that match this map.
   C. Your typed answers to these questions.
Purpose: This assignment is intended to help you integrate the theoretical work on doctrines and deterrence with the practical aspects of nuclear weapons that we discussed in class. It is also intended to walk you through the process of designing and defending a policy position on weapons of mass destruction.

Assignment: Type an essay of at least 2500 words (example: about 10 double-spaced pages in 12-point Times New Roman) accomplishing the following objectives, in order. Your essay should have an introduction with a clear thesis statement that you will defend throughout the paper, clearly labeled sections addressing each of the objectives listed below, and a conclusion that demonstrates that your solutions to these problems compel one to support your thesis. For full credit, use the APSA citation system (available on Canvas under Writing Resources).

*Reminder:* You need to cite your sources. If you use a direct quote (three or more words) from any source, you must enclose it within quotation marks and indicate the source (and page number, if applicable). If you paraphrase a source, you must indicate the source. You must attach a Works Cited page listing all of your sources. Be aware that (1) quotation of even a few words without quotation marks is an academic integrity violation, as is (2) paraphrasing an article that you don’t cite or (3) citing sources which you did not consult.

Objectives: Your fundamental tasks are to evaluate the soundness of Kroenig’s (2018) argument for American nuclear superiority and then to use your reasoning to address the future of American nuclear weapons policies.

I. Be sure to have completed all assigned readings for the second half of the course, especially Kroenig (2018).

II. Write up your essay. Ensure that along the way, it answers the following pressing questions, using available evidence from the course.

A. What should be the primary goal(s) of American nuclear weapons policies, normatively speaking?
B. What is Kroenig’s (2018) argument, and what relevance does it have to the normative goals you argue that the US should pursue?
C. To what extent is Kroenig’s argument (in)correct, incomplete, and/or supported by the available evidence?
D. As both Long (2018) and Kristensen and Norris (2018) argue, Russia is modernizing its nuclear capabilities. Why is it doing this?
E. Given the goals that US nuclear policies should have, how should the US react to Russia’s ongoing modernization program?
F. How will Russia react to your policy proposals if they were enacted?
G. Over the next few decades, will your policy recommendations tend to increase or decrease the risks of (1) large-scale conventional war in Europe and (2) nuclear war between Russia and the United States?