

An Introduction to Technology and War

Tuesday/Thursday, 11:00am-12:20pm, Baker Hall 255A

Course Number: 84-274 / 84-674

Instructor Information

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What Is This Course About?

“Advancements” in military technology over time have enabled countries to kill quickly, with pinpoint precision, and on a massive scale from thousands of miles away. Today, emerging technologies also empower state and non-state actors to use lethal force via remote control and may even allow machines to kill autonomously. While once the purview of science fiction, lethal autonomous weapons systems—sometimes referred to as killer robots—are becoming a reality. This course will trace developments in military technology from the gunpowder revolution in the 15th century and the nuclear revolution in the 20th century to emerging technologies like drones and artificial intelligence in the 21st century. Each class will focus on—in roughly chronological order—a different military innovation, and will use that innovation to analyze a different major political science theory or debate. In particular, we will assess the development, spread, effectiveness, and morality of military innovations and address critical questions for scholarship and policy. Does military technology determine victory and defeat on the battlefield, and how have technologically inferior actors like the Viet Cong, Mujahideen, and Taliban managed to beat superpowers such as the Soviet Union, and United States? Do drone strikes increase or decrease terrorism, and what impact do remotely controlled systems have on conflict between states? Do states always pursue military technologies to improve their security, or does the desire for status and prestige sometimes impact the kinds of weapons states want? Does having more nuclear weapons than your opponent matter, and is there a “taboo” against the use of weapons of mass destruction? Why are some countries able to successfully innovate whereas others fail? Could the use of lethal autonomous weapons ever be considered ethical? These are just a handful of the questions we will explore in this class. By the end of the course, students will have a grasp of the history of military innovation and many of the key debates and theories in this field.

Assignments/Grading

In-Class Participation (15%)

I hope you will learn something from me over the course of the semester, but just as if not more importantly I believe you will learn much from each other (and I will learn from you!). However, this requires that you attend and actively participate in class. Participation includes asking questions, answering questions I ask the class as a whole, and being active in small group work.

Reading Quizzes (30%)

Cramming before midterms or finals is counter-productive to learning because (a) that means you cannot effectively participate in class discussion, and (b) research has shown that information studied in a cramming session is less likely to be remembered in the long-term. To provide a bit of an incentive or “nudge” for you to do the reading each week, we’ll start most Thursday classes with a short (10 minute) closed-note quiz. They will mostly consist of multiple choice, true/false questions, and (very) short answer questions. The questions are not meant to trick you! My goal in designing the quizzes is that if you did the reading, you should get near 100%. And because we’re doing quizzes, we will *not have an in-class midterm or final exam*. If you want to take quizzes on your computer, please download Respondus LockDown Browser (instructions are on the last page).

Written Policy Memo (20%)

Pick one session of the course (e.g., the class on the aircraft, strategic bombing, and World War II). Your goal is to write a policy memo that is between 1,250 and 2,000 words (about 5-8 pages double-spaced; Use Chicago style *footnotes* to cite your sources. These footnotes do *not* count towards the word limit and there’s no need for a separate bibliography section) that does one of the following:

1. Applies the theory/debate we will discuss in class to a *contemporary* international relations policy issue, debate, or case. For example, for the week on offense-defense theory, you might write about whether some current-generation technology is changing the offense-defense balance. For the week on gender, you might write about how gender hierarchies are impacting the integration of some current-generation technology. For the week on the mass army, you might write about current debates related to whether the US (or any other country!) should have an all-volunteer or conscription-based military.
2. Discusses a *contemporary* international relations policy issue, debate, or case related to the technology we will discuss in class. For example, for the weeks on nuclear weapons, you might write about current debates related to whether the US should have low-yield nuclear weapons, what the US policy towards Iran’s nuclear program should be, or whether Japan/South Korea/Taiwan should acquire nuclear weapons. For the week on social media, you could write about to what extent the government should enact regulations to reduce the chances of foreign states or terrorist groups weaponizing these platforms. For the week on the artillery revolution or dynamite, you could interpret the technology broadly to focus on international firearm or explosive regulations in the current day.

If you have any uncertainty about whether an idea meets these criteria, please reach out to me.

How Do I Sign Up for a Topic/Week? You can access the sign-up sheet [here](#). **The deadline to sign up is September 10.** Only a certain number of people will be allowed to choose each class session and so act fast.

Memo Guidelines: The memo is due 7 days after the class session you are writing about. The memo should be between 1,250 and 2,000 words (about 5-8 pages double-spaced). Use Chicago style *footnotes* to cite your sources. These footnotes do *not* count towards the word limit and there's no need for a separate bibliography section. Your memo should include at least six sections. First, three lines ("to," "from," and "regarding") that say who the memo is to, who it is from, and what it is regarding. Second, an executive summary section that very briefly (in one paragraph) explains what the contemporary problem is, why it matters, and what your principal recommendation(s) are (this does not contribute to the word limit). Third, a section on the problem with current policy. Fourth, a section on why this is an important issue. Fifth, a section outlining your specific policy recommendation(s) (e.g., "policy recommendation 1," "policy recommendation 2," etc.). You need not make more than one policy recommendation, but you can if you want to. In this section, discuss how challenges related to adoption (e.g., getting Congress or the United Nations to adopt this policy change) and implementation will be overcome. Most importantly, in this section explain your logic for why adopting these policies is the best option to solve the problem. Sixth, a section on the likely criticisms of your policy recommendation(s). In this section, "steel-man" (rather than "straw-man") your actual or hypothetical opponents. Explain why we should dismiss these criticisms or how your policy recommendations address them (e.g., perhaps you include certain qualifications in your policy proposal or conditions where you recommend policy should be abandoned). Seventh, a short conclusion section that reminds the decision-maker you're trying to convince of the bigger-picture and what the consequences would be if they don't adopt your recommendations. Where appropriate, try and reference course readings and concepts (especially the readings for the class session you're focused on) to inform your analysis.

Research Essay (35%)

Your paper should assess one or more of the theories/debates on the syllabus using one or more technologies and/or case studies that was not the main technology/case we discussed in class. For example, if you wanted to analyze adoption-capacity theory, then you could not do so by focusing on carrier warfare. If you wanted to analyze strategic bombing, then you could not do so by focusing on World War II. Additionally, do not pick a technology/case that the author of the theory analyzes in their article/book. If you have any uncertainty about whether an idea meets these criteria, please reach out to me. Specifically, the paper should do one of the following:

1. Assess one theory with one technology or historical case study.
2. Assess one theory with two technologies or historical cases to consider *when* the theory is most and least likely to hold. Specifically, explain the variable(s) that impacts when the theory has greater or lesser explanatory power. For example, you might consider when drone strikes are most and least likely to reduce terrorism.
3. Assess two competing theories (e.g., adoption-capacity theory and status-seeking theory) or one debate (e.g., the debate over whether drones are stabilizing or destabilizing for international conflict) with one technology or historical case.
4. Use statistical analysis to test either (a) whether a theory holds on average in a large sample, (b) what factors make a theory more or less likely to hold (i.e., assess moderators / interaction effects), (c) what mechanism(s) explain why a theory operates, or (d) whether

a prior statistical finding related to a theory we discussed holds for a rigorous replication that changes the model in some non-trivial way. If you choose this option, then your analysis should not simply duplicate a prior statistical study; it must be novel in some way.

I'm open to other options as well, but consult with me before pursuing them.

Undergraduate Students: Your essay should be between 2,500 and 3,000 words (about 10-12 pages double-spaced). The bibliography does *not* count towards the 2,500-3,000 words.

Graduate Students: Your essay should be between 4,500 and 5,000 words (about 18-20 pages double-spaced). If you are utilizing case studies, then you should also use at least some primary sources (e.g., government documents, speeches, interviews, etc.). The bibliography does *not* count towards the 4,000-5,000 words.

How Should the Essay Be Organized? Your essay should include at least six sections. First, an introduction that motivates the importance of your topic and posits a clear thesis statement outlining your argument/findings. Second, a short literature review section that explains the logic of the theory/theories/debate you are testing. Third, a section on hypotheses that either (a) clearly lays out what empirical evidence you should find if the theory (or theories) is true, or (b) explains your theoretical argument about when the theory is more/less likely to hold. Fourth, a section on case selection. Justify your choice of case(s) or statistical setup. Fifth, a section outlining the evidence from your case(s) or statistical analysis and how it supports or contradicts the hypotheses you posited. Explain potential counterarguments to your interpretation of the evidence and respond to them. Sixth, a conclusion that discusses the implications of your findings for policy and scholarship. Here is where you might also explicitly note the limitations of your analysis.

750-1,000 Word Outline Due November 20: This should include your research question, what your theoretical argument is (if applicable), what case(s) you plan to utilize or what statistical analysis you will conduct, why you chose that case or statistical approach, and what you believe your case(s)/statistical analysis will show from an initial look at the evidence/data. This is worth 5% of your overall grade. Post this on Canvas by 8:00pm on November 20.

Final Draft Due December 8: This is worth 30% of your overall grade. Post this on Canvas by 10:00pm.

Grading Scale

Undergraduate Students: A (90-100%), B (80-89%), C (70-79%), D (60-69%) R (under 60%).

Graduate Students: A (93-100%), A- (90-92%), B+ (87-89%), B (83-86%), B- (80-82%), C+ (77-79%), C (73-76%), C- (70-72%), D+ (77-79%), D (63-66%), D- (60-62%), R (under 60%).

Missing Class / Late Assignments Due to Extenuating Circumstances

Attending and participating in class discussions helps facilitate learning; not only for you, but also for your peers. Therefore, part of your grade is based on your attendance and active participation. Turning in assignments on time is also important for ensuring that no student(s) have an unfair advantage. It's also good practice for your future job. With that being said, your health, wellness, religious beliefs, professional advancement, etc. is important to me and I recognize you may occasionally need to miss class or turn in an assignment late due to extenuating circumstances.

This includes (but isn't limited to) a physical or mental health crisis, family medical emergency, religious event, or job interview. If you need to miss class or cannot turn in an assignment on time due to one of these issues, then please *let me know at least 24 hours in advance* (except in the case of an emergency) and we can find an appropriate accommodation.

Overview of the Class Schedule

Many political science courses focus primarily on theory and use the occasional historical case study to test the theory, whereas other classes focus principally on history with some theory sprinkled in. In this class we will attempt to marry theory with history so that we can learn about both simultaneously. To that end, each week will focus on—in roughly chronological order—a different technology/innovation, and we will use that technology/innovation to analyze a different major political science theory or debate. All readings are available [here](#), or by going to the course Canvas page and navigating to the “Files” section.

The Era	The Innovation	The Political Science Debate/Question
14 th Century	Infantry Revolution (especially the longbow)	Do gender norms impact the kinds of technologies states want and adopt?
15 th Century	Artillery/Gunpowder Revolution (especially the cannon)	Offense-Defense Theory: Does the nature of technology impact the likelihood of war?
18 th – 19 th Century / Napoleonic France	Levée en Masse + Industrial Revolution (especially the railroad and telegraph)	Does nationalism or technology better explain the emergence and sustainability of the mass army?
Late 19 th Century / Early 20 th Century	Dynamite	Lethal Empowerment Theory: What kinds of technologies empower terrorists?
Early 20 th Century / World War I	Chemical Weapons	The Chemical Weapons Taboo: Are there strong norms against using certain kinds of technologies?
Early 20 th Century / World War I	Submarines	Alfred Mahan's Theory of Naval Strategy: Does targeting the civilian economy via sea power work? Is it ethical?

Mid 20 th Century / World War II	Aircraft	Theories of Strategic Bombing: Does directly attacking civilians via airpower work? Is it ethical?
Mid 20 th Century and Beyond	Aircraft Carrier Warfare	Adoption-Capacity Theory: Why haven't that many countries acquired aircraft carriers?
Mid 20 th Century and Beyond	Aircraft Carriers	Do states sometimes pursue weapons to enhance their status rather than to increase their combat power?
Mid 20 th Century and Beyond	Nuclear Weapons	Does having more nuclear weapons than your opponent matter?
Late 20 th Century / Gulf War	Information Revolution (especially precision-guided weapons and satellites)	Has a revolution in military affairs occurred?
Late 20 th Century / Gulf War	Information Revolution	Theory of the Modern System of Warfare: Does technology or force employment determine victory and defeat?
Post-World War II	Military Medicine	Is war on the decline? If so, then why?
Early 21 st Century	Suicide Bombing	Why do weaker powers sometimes beat stronger ones?
Early 21 st Century	Uninhabited Aerial Vehicles (aka Drones)	Do drones advantage the offense or defense?
Early 21 st Century	Uninhabited Aerial Vehicles (aka Drones)	Do drones increase or decrease terrorism?
21 st Century	Social Media	Is social media an effective tool of election interference?
21 st Century	Cyber	How transformational is the cyber domain?
The Future	Lethal Autonomous Weapons Systems	Are LAWS a moral abomination or a moral imperative?

Detailed Class Schedule

August 27: Introduction to the Course

- Suggested Reading
 - Andrew F. Krepinevich, "From Cavalry to Computer: The Pattern of Military Revolutions," *The National Interest*, [Link](#), 13 pages.

August 29: Defining Military Innovation

- Big Question: What counts as a military "innovation"?
- Required Reading
 - Michael C. Horowitz and Shira Pindyck, "What Is a Military Innovation and Why It Matters," *Journal of Strategic Studies*, [Link](#), Only pages 85-103.
 - Kendrick Kuo, "How to Think About Risks in US Military Innovation," *Survival*, [Link](#), 10 pages.
- Discussion Questions
 - Do you buy the Horowitz/Pindyck definition of military innovation? Or is it too broad or too narrow?
 - Can things other than tangible weapons, such as novel tactics or strategies, be considered military innovations?
 - Is actual implementation/adoption of a technology or strategy necessary for it to be considered a military innovation?
 - To be considered an innovation, should a technology or strategy have to demonstrate some measure of success on the battlefield?
 - What factors increase the risks of innovation backfiring?

September 3: The Infantry Revolution and How Gender Hierarchies Impact the Integration of Military Innovations

- Big Question: Why do actors acquire and integrate some technologies into their arsenals and not others?
- Required Reading
 - Shira Pindyck, *Innovation and Inclusion in the Armed Forces*, Chapter 2: "A Theory of Military Innovation and Gender," [Link](#), Only pages 22-45.
 - Bernard and Fawn M. Brodie, *From Crossbow to H-Bomb*, Chapter 2: "The Middle Ages," Access on Canvas, Only pages 35-40.
 - Clifford J. Rogers, "The Military Revolutions of the Hundred Years War," *Journal of Military History*, Access from the course website, Only pages 245-257.
 - Joshua Schwartz and Christopher Blair, "Why More Female Leaders Won't Lead to More Peace," *Lawfare*, [Link](#), 5 pages.
- Discussion Questions
 - What are the gender-related factors Pindyck identifies as impacting the likelihood a technology will be integrated or not?
 - Do technologies associated with the infantry revolution (e.g., the longbow and crossbow) provide compelling evidence for Pindyck's theory? Is this an easy, hard, or moderate test of the theory?

- How important a variable do you think gender is compared to others in explaining the integration of military technologies?
- Are there current-era technologies where gender-related factors are playing a role?
- Will changing gender norms reduce the impact gender plays in the integration of military technologies?

September 5: NO Class (I'll be away for a conference)

September 10: The Artillery Revolution, Offense-Defense Theory, and How Technology Shapes the Probability of War

- Reminder: [Sign up](#) for your policy memo topic by the end of the day!
- Big Question: What factors impact the likelihood of war?
- Required Reading
 - Sean M. Lynn-Jones, "Offense-Defense Theory and Its Critics," *Security Studies* (1995), [Link](#), 31 pages.
 - Bernard and Fawn M. Brodie, *From Crossbow to H-Bomb*, Chapter 2 ("The Middle Ages") and Chapter 3 ("The Impact of Gunpowder"), Access on Canvas, Only pages 31 and 41-54.
 - Keir A. Lieber, "Grasping the Technological Peace: The Offense-Defense Balance and International Security," *International Security* (2000), [Link](#), Only pages 77-85.
 - David Sacks, "Why China Would Struggle to Invade Taiwan," *Council on Foreign Relations*, [Link](#), Read online via the link.
- Discussion Questions
 - Can weapons be effectively classified as offensive or defensive?
 - Can the overall offense-defense balance be measured empirically *before* the outcome of a conflict is known?
 - Does it matter if subjective perceptions of the overall offense-defense balance don't match the objective reality?
 - How important is technology to determining the offense-defense balance relative to other variables?
 - Can offense-defense theory explain the dynamics of other critical conflicts, such as World War I, World War II, and the Cold War?
 - Does offense or defense have the advantage today? How does your assessment impact how you view the optimal response to a Chinese invasion of Taiwan?

September 12: Levée en Masse and Whether Nationalism or Technological Advances Better Explain the Mass Army

- Big Question: How do you get hundreds of thousands of people to risk their lives and fight for your cause?
- Required Reading
 - Michael C. Horowitz and Shira Pindyck, "What Is a Military Innovation and Why It Matters," Appendix: "Levée en Masse," *Journal of Strategic Studies*, [Link](#), Only the 7-page section titled "Levée en Masse" in the appendix.

- Barry R. Posen, “Nationalism, the Mass Army, and Military Power,” *International Security*, [Link](#), Only pages 80-99 and 120-122.
- Massimiliano Gaetano Onorato et al., “Technology and the Era of the Mass Army,” *Journal of Economic History*, [Link](#), Only pages 449-457 and 473-476.
- Jason Lyall, “It’s Hard for Russia to Invade Ukraine When Its Soldiers Don’t Want To Be There,” *Good Authority*, [Link](#), 4 pages.
- Sayed Sarwar Amani and Andrew Macaskill, “Desertions Deplete Afghan Forces, Adding to Security Worries,” *Reuters*, [Link](#), 3 pages.
- Discussion Questions
 - Do you think the Levée en Masse should qualify as a military innovation?
 - Which explanation for the rise of the “mass army” do you find more compelling? Posen’s nationalism-based argument or Onorato et al.’s technology-based argument?
 - Do you think a conscription or volunteer-based military is more effective? From an ethical perspective, is one superior to the other?
 - What relevance does this debate have to the Russia-Ukraine War, America’s War in Afghanistan, and a potential war between China and Taiwan?
- Quiz

September 17: Chemical Weapons in World War I, Theories about WMD “Taboos,” and Whether Certain Military Innovations Should Never Be Used

- Big Question: Are there some weapons that states will refuse to use even if they have military utility on the battlefield?
- Required Reading
 - Jonathan B. Tucker, “War of Nerves,” *NPR*, [Link](#), 7 pages.
 - Richard Price and Nina Tannenwald, “Norms and Deterrence: The Nuclear and Chemical Weapons Taboos,” In *The Culture of National Security*, Columbia University Press, [Link](#), Only pages 1-top of 12 of the PDF.
 - Thomas M. Dolan, “Unthinkable and Tragic: The Psychology of Weapons Taboos in War,” *International Organization*, [Link](#), Only pages 37-38 and 48-top of page 57.
 - Joshua A. Schwartz, Jonathan A. Chu, and Christopher W. Blair, “What Americans (Really) Believe About Chemical Weapons,” *Political Violence at a Glance*, [Link](#), 4 pages.
 - Nicholas Kristof, “Trump Was Right to Strike Syria,” *New York Times*, [Link](#), 4 pages.
 - Joby Warrick, “ISIS Planned Chemical Attacks in Europe, New Details on Weapons Program Reveal,” *Washington Post*, [Link](#), 6 pages.
- Discussion Questions
 - What’s the difference between the deterrence and normative explanation for the non-use of chemical weapons?
 - How did Germany justify violating the Hague Conventions? What does that suggest about the challenges with enforcing international law?
 - Under what conditions are states or individuals more likely to support chemical weapons use? Is chemical weapons use ever justified?
 - Should the US and other countries enforce the chemical weapons taboo with military force?
 - How does this discussion relate to nuclear weapons?

September 19: Dynamite, Lethal Empowerment Theory, and Why Certain Military Innovations Empower Non-State Actors

- Guest Speaker: [Audrey Kurth Cronin](#), Director of the Carnegie Mellon Institute for Strategy and Technology
- Big Question: Why do non-state actors (e.g., terrorists) acquire and integrate some technologies into their arsenals and not others?
- Required Reading
 - Audrey Kurth Cronin, *Power to the People: How Open Technological Innovation is Arming Tomorrow's Terrorists*, Introduction, Chapter 1 ("Classic Models of Military Innovation: Shaped by the Nuclear Revolution"), Chapter 3 ("Dynamite and the Birth of Modern Terrorism"), and Chapter 4 ("How Dynamite Diffused"), Access through the course website or online through CMU's library, Only pages 1-4, 12-15, 19-31, 61-63, 73-79, 94-98, 109-112, and 116-125.
 - Greg Myre, "A Chinese Drone for Hobbyists Plays a Crucial Role in the Russia-Ukraine War," *NPR* (2023), [Link](#).
- Recommended Reading
 - Audrey Kurth Cronin, "Cyber-Mobilization: The New Levée en Masse," *Parameters*, [Link](#), 10 pages.
- Assignment: Post two questions for Professor Cronin on Canvas under the "Discussions" section (see [here](#)).
- Discussion Questions
 - What is the difference between open and closed systems of technological innovation? How does this difference help explain the likelihood that technology will spread to violent non-state actors?
 - How does Cronin's lethal empowerment theory help explain the spread of dynamite technology to violent non-state actors? Is this case study compelling evidence for her theory?
 - What does lethal empowerment theory indicate about the likely spread of emerging military technologies to non-state actors, such as drones, artificial intelligence, and cyber capabilities?
- NO Quiz

September 24: Submarines in World War I, Mahan's Theory of Naval Power, and the Effectiveness of Using Sea Power Against Civilians

- Big Question: What determines the outcome of wars?
- Required Reading
 - Stephen Van Evera, "The Spiral Model v. The Deterrence Model," *MIT*, [Link](#), 4 pages.
 - "The Blockade of Germany," *UK National Archives*, [Link](#), 2 pages.
 - Bernard and Fawn M. Brodie, *From Crossbow to H-Bomb*, Chapter 7: "World War One, The Use and Non-Use of Science," Access on Canvas, Only pages 180-189.
 - Kevin D. McCranie, *Mahan, Corbett, and the Foundations of Naval Strategic Thought*, Access from the course website, Only pages 12-22, 95-100, 161-172, 183-190, and 215-218
 - Note: Pages 215-218 are marked as pages 112-144 in the McCranie_StrategicSeapower5 pdf on the course website.

- “Gaza Strip: Devastated by Conflict and Israel’s Economic Blockade,” *Reuters*, [Link](#), 3 pages.
- Discussion Questions
 - Can naval power ever be a sufficient condition to win conflicts? Is it always a sufficient condition? How important is naval power relative to other dimensions of power (e.g., land or air)?
 - Did Germany use its naval power in World War I in accordance with Mahan’s strategic guidance? Was German maritime strategy successful? What about Allied maritime strategy?
 - Is it ethical to target non-military vessels or impose blockades that harm civilians in the course of a war?
 - How effective have other blockades been, such as Israel’s blockade on Gaza?
 - This isn’t covered in the readings, but what role does offense-defense theory play (if any) in explaining the dynamics of World War I? What about gender theory?

September 26: Aircraft in World War II, Theories of Strategic Bombing, and the Effectiveness of Using Air Power Against Civilians

- Big Question: What determines the outcome of wars?
- Required Reading
 - Brad Lendon and Emiko Jozuka, “History’s Deadliest Air Raid Happened in Tokyo During World War II and You’ve Probably Never Heard of It,” *CNN*, [Link](#), Only available online (not on Canvas).
 - Robert A. Pape, *Bombing to Win: Air Power and Coercion in War*, Chapter 3: “Coercive Air Power,” Access from the course website, [Only pages 55-86](#).
 - Ward Wilson, “The Winning Weapon? Rethinking Nuclear Weapons in Light of Hiroshima,” *International Security*, [Link](#), 18 pages.
- Discussion Questions
 - What four types of coercive air strategies does Pape identify?
 - How effective was strategic bombing during World War II?
 - Which types do you believe are most and least effective, or are none of them effective? Why or why not?
 - Is it ever morally acceptable to use airpower directly against civilians? If not, then should America’s actions in World War II be considered the equivalent of a war crime?
 - Did the US make the right decision to use nuclear weapons against Japan? What about to firebomb Tokyo?
- Quiz

October 1: Aircraft Carrier Warfare and Adoption-Capacity Theory

- Big Question: Why do actors acquire and integrate some technologies into their arsenals and not others?
- Required Reading
 - Michael C. Horowitz, *The Diffusion of Military Power: Causes and Consequences for International Politics*, Chapter 1 (“Introduction”) and Chapter 3 (“Carrier Warfare”), Access from the course website, 42 pages.

- Ken Moriyasu, "U.S. Positions 12,000 Sailors Off Israel with Second Carrier," *Nikkei Asia*, [Link](#), 3 pages.
- Discussion Questions
 - What is adoption-capacity theory?
 - Does it adequately explain the spread (or lack thereof) of carrier warfare after World War II?
 - What are the other variables/factors that likely help explain the spread of military technology? Are the variables adoption-capacity theory identifies the most important?
 - Do gender theory and adoption-capacity theory contradict each other? Do they complement each other in any ways? Same questions for lethal empowerment theory.
 - What does adoption-capacity theory suggest about the likely spread of emerging military technologies, such as drones, artificial intelligence, and cyber capabilities?

October 3: The Aircraft Carrier Club and the Role of Status-Seeking in Military Acquisitions

- Big Question Why do actors acquire and integrate some technologies into their arsenals and not others?
- Required Reading
 - Lilach Gilady, *The Price of Prestige: Conspicuous Consumption in International Relations*, Chapter 1 ("Explaining Conspicuous Consumption in International Relations") and Chapter 3 ("The Aircraft Carrier Club"), Access on the course website, [Only pages 1-top of 22 in Chapter 1](#) and [Only pages 55-58, 65-73, and 81-84 in Chapter 3.](#)
 - Paul Musgrave, "Review of The Price of Prestige", *Political Science Quarterly*, [Link](#), 2 pages.
 - "Aircraft Carrier are Big, Expensive, Vulnerable—and Popular," *The Economist*, [Link](#), 8 pages.
- Discussion Questions
 - What is the logic for why states may pursue certain military technologies to enhance their status? How does this explanation differ from standard realist models that focus on security threats?
 - Does the theory effectively explain the proliferation of aircraft carriers? Does it do so better or worse than adoption-capacity theory?
 - We previously discussed the role gender may play in the integration of certain military technologies, as well as adoption-capacity theory. Could the variables in these theories help explain which military technologies are likely to be perceived of as higher status than others?
 - What does Gilady's prestige-focused theory say about the likely spread of emerging military technologies, such as drones, artificial intelligence, and cyber capabilities?
- Quiz

October 8: Nuclear Weapons and Debates Over the Value of Nuclear Superiority

- Big Question: Is having more of a certain weapon than your opponent always better?
- Required Reading
 - Hal Brands, “The US Needs More Nukes. Biden Finally Gets That,” *Bloomberg*, [Link](#), 3 pages.
 - Matthew Kroenig, *The Logic of American Nuclear Strategy: Why Superiority Matters*, [Link](#), Only pages 1-3 of the pdf in the Introduction and Only pages 1-14 of the pdf in Chapter 1.
 - Matthew Fuhrmann and Todd S. Sechser, “Debating the Benefits of Nuclear Superiority for Crisis Bargaining Part II,” *Duck of Minerva*, [Link](#), A few pages.
 - Note: Use the link here rather than accessing this reading through the course website.
 - Matthew Kroenig, “Debating the Benefits of Nuclear Superiority for Crisis Bargaining Part IV,” *Duck of Minerva*, [Link](#), A few pages.
 - Note: Use the link here rather than accessing this reading through the course website.
 - David C. Logan, “The Nuclear Balance Is What States Make of It,” *International Security*, [Link](#), Only pages 172-197.
- Discussion Questions
 - What are the theoretical arguments for and against nuclear superiority?
 - Empirically, how should we measure nuclear superiority? Is the Kroenig or Logan operationalization better?
 - Should the United States aim to have more nuclear weapons than either China or Russia? Should it have more nuclear weapons than both combined? Or does it not matter as long as the US maintains a second-strike capability?

October 10: Film Screening and/or Catch-Up Day

- Required Reading: None
- Quiz

October 15/October 17: NO CLASS (Fall Break)

October 22: The Information Revolution, Debates About Whether a Revolution in Military Affairs Has Occurred, and the Gulf War

- Big Question: When do we know that the character of war has been changed forever by the introduction of a new set of technologies?
- Required Reading
 - Max Boot, *War Made New: Technology, Warfare, and the Course of History, 1500 to Today*, “The Rise of the Information Age,” Gotham, Access on Canvas, [Only pages 307-313.](#)
 - Keith L. Shimko, *The Iraq Wars and America’s Military Revolution*, Cambridge University Press, [Link](#), Only pages 1-3 and 53-90.
 - Roundtable on Keith Shimko’s *The Iraq Wars and America’s Military Revolution*, “Review by Jasen J. Castillo,” H-Diplo/ISSF, [Link](#), Only pages 7-10 in the pdf.

- Warren P. Strobel et al., “Russia Launched Research Spacecraft for Antisatellite Nuclear Weapon Two Years Ago, U.S. Officials Say,” *Wall Street Journal*, [Link](#), 6 pages.
- Discussion Questions
 - What are the key elements of the “information revolution”? How did they materialize in the Gulf War?
 - How should we define a “revolution” in military affairs? What are its key elements?
 - Was the information revolution a true revolution in military affairs? If not, then should some of the other “revolutions” in military affairs we talked about be recoded?
 - Is the Gulf War case compelling evidence for the argument that a revolution in military affairs has occurred?
 - How are the technologies associated with the information revolution impacting current conflicts, such as the Russia-Ukraine War?
 - What role do private actors (e.g., Elon Musk) that control information-age technologies play in international relations?

October 24: The Information Revolution, Biddle’s Theory of the Modern System, and the Gulf War

- Big Question: What determines the outcome of wars?
- Required Reading
 - Stephen Biddle, *Military Power: Explaining Victory and Defeat in Modern Battle*, Chapter 1 (“Introduction”), Chapter 2 (“A Literature Built on Weak Foundations”), Chapter 3 (“The Modern System”), Chapter 4 (“The Modern System, Preponderance, and Changing Technology”) and Chapter 7 (“Operation Desert Storm”), Access on the course website, [Only pages 1-5, 14-27, 35-39, 44-51, 52-62, Table 4.1 on page 74, and 132-149.](#)
 - Michael Horowitz and Stephen Rosen, “Evolution or Revolution?” *Journal of Strategic Studies*, [Link](#), [Only pages 442-445.](#)
 - Ryan Grauer and Michael C. Horowitz, “What Determines Military Victory? Testing the Modern System,” *Security Studies*, [Link](#), [Only pages 83-85 and 111-112.](#)
 - Gil Barndollar, “Ukraine Has the Battlefield Edge: Russia’s Mobilization Has Given It a Numerical Advantage, But Wars Are Not Won By Manpower Alone,” *The Atlantic* (2023), [Link](#), 7 pages.
- Discussion Questions
 - What is the modern system? How does its explanation for military outcomes differ from other prominent theories?
 - Does Biddle believe modern technological developments make the modern system irrelevant/less relevant, and how are his views related to the revolution in military affairs debate we discussed last week? Is his argument compelling? Does it hold for emerging technologies like drones, cyber, and AI?
 - How does Biddle’s argument relate to discussions we had in previous weeks about offense-defense theory, the importance of skilled commanders, Mahan’s naval strategy, and strategic bombing?
 - Does the Gulf War case provide persuasive evidence for the significance of the modern system?
- Quiz

October 29: The Revolution in Military Medicine and Debates Over Whether War is on the Decline

- Big Question: What factors impact the costs of war?
- Required Reading
 - Joshua S. Goldstein and Steven Pinker, "War Really Is Going Out of Style," *New York Times*, [Link](#), 3 pages.
 - Steven Pinker, *The Better Angels of Our Nature: Why Violence Has Declined*, [Link](#), Only pages 10-14, 182-185, and 236-242 of the pdf.
 - John Mearsheimer, "Review Symposium: Has Violence Declined in World Politics?" *Perspectives on Politics*, [Link](#), Only pages 570-572.
 - Tanisha M. Fazal, "Dead Wrong? Battle Deaths, Military Medicine, and the Exaggerated Reports of War's Demise," *International Security*, [Link](#), Only pages 95-117 and page 122.
- Discussion Questions
 - What is the evidence Pinker utilizes to argue war is on the decline?
 - What are the causal mechanisms Pinker and Goldstein put forward to explain the alleged decline of war? Are they compelling?
 - What is Fazal's response to the Pinker/Goldstein thesis that war is on the decline? Is the evidence she employs compelling? Do you think her work completely overturns the thesis that war is on the decline, simply moderates it to some extent, or doesn't challenge it at all?

October 31: Suicide Bombing and Theories of Why the Weak Win

- Big Question: What determines the outcome of wars?
- Required Reading
 - Yaroslav Trofimov, "Afghanistan Government Collapses as Taliban Take Kabul," *Wall Street Journal*, [Link](#), 6 pages.
 - Andrew Mack, "Why Big Nations Lose Small Wars: The Politics of Asymmetric Conflict," *World Politics*, [Link](#), Only pages 175-187.
 - Ivan Arreguín-Toft, "How the Weak Win Wars: A Theory of Asymmetric Conflict," *International Security*, [Link](#), Only pages 93-117.
 - Michael C. Horowitz, "Nonstate Actors and the Diffusion of Innovations: The Case of Suicide Terrorism," *International Organization*, [Link](#), Only pages 39-40 (Section titled: "Are Suicide Attacks a Military Innovation?").
 - Jakana L. Thomas, "Wolves in Sheep's Clothing: Assessing the Effect of Gender Norms on the Lethality of Female Suicide Terrorism," *International Organization*, [Link](#), Only pages 769-773.
- Discussion Questions
 - What is Mack's theory for why big nations lose small wars?
 - How does Arreguín-Toft's theory differ from Mack's? Which theory is most convincing?
 - Should suicide terrorism be classified as a military innovation?
 - How does suicide terrorism relate to the theories by Mack and Arreguín-Toft? Is it a wise strategy for terrorist and other non-state groups to adopt?
 - Does the increasing use and (potentially) effectiveness of female suicide bombers support, contradict, or qualify Pindyck's argument about the role of gender in the integration of military innovations?

- Does suicide terrorism impact the offense-defense balance?
- Thinking back to our discussion of nationalism, the mass army, and the Levée en Masse, does recruiting suicide bombers present any particular challenges relative to more conventional soldiers?
- Can lethal empowerment theory help explain the diffusion of this potential “innovation”?
- How does the logic of suicide bombing relate to the logic of strategic bombing?
- Quiz

November 5: NO CLASS (Democracy Day)

November 7: The Drone Revolution and Debates About Whether Drones Advantage the Offense and Are a Stabilizing or Destabilizing Force for Interstate Conflict

- Big Question: Is having more of certain types of weapons in the world a good thing for international peace and stability?
- Required Reading
 - Jason Lyall, “Drones Are Destabilizing Global Politics: Simple Vehicles Make Conflict Tempting and Cheap,” *Foreign Affairs*, [Link](#), 4 pages.
 - Antonio Calcara et al., “Why Drones Have Not Revolutionized War: The Enduring Hider-Finder Competition in Air Warfare,” *International Security*, [Link](#), Only pages 130-139, 143-144, 147, bottom of 149-153, 161-165, and 169-171.
 - Jacquelyn Schneider, “Unscorable at 12: Technically Correct, But Misses the Mark,” *Security Studies*, [Link](#), 7 pages.
 - Erik Lin-Greenberg, “Game of Drones: What Experimental Wargames Reveal About Drones and Escalation,” *War on the Rocks*, [Link](#), 8 pages.
- Discussion Questions
 - In what ways can drones be a destabilizing force in interstate conflict? In what ways can they be a stabilizing force? On net, which perspective do you find most persuasive?
 - From a methodological perspective, do you find Lin-Greenberg’s experiment conducted on national security practitioners compelling? Is it more, less, or just as convincing as qualitative evidence from real-world cases or statistical evidence would be?
 - What role have drones played in the interstate conflict between Russia and Ukraine? Does this case help settle the debate?
 - What should the United States’ policy towards drone proliferation be? Should the United States put any restrictions on how it uses drones in interstate conflict?
- Quiz

November 12: Drones and Debates About Whether Drones Reduce or Increase Terrorism

- Big Question: What are effective ways to counter terrorism?
- Required Reading
 - Anouk S. Rigterink, “Drone Dilemma: The Risks of Washington’s Favorite Counterterrorism Tool Often Outweigh the Rewards,” *Foreign Affairs* (2021), [Link](#), 4 pages.
 - Zach Beauchamp, “The Entire Basis for Obama’s Drone Strategy May Be Wrong,” *Vox* (2014), [Link](#), 5 pages.
 - Richard Wike et al., “Global Opposition to U.S. Surveillance and Drones, But Limited Harm to America’s Image,” *Pew* (2014), [Link](#), Only pages 4-6.
 - “Living Under Drones: Death, Injury, and Trauma to Civilians from US Drone Practices in Pakistan,” *Stanford Law School International Human Rights and Conflict Resolution Clinic / NYU School of Law Global Justice Clinic* (2012), [Link](#), Only pages v-viii, 55-62, 74-76, and 80-88.
 - Joshua Schwartz, Matthew Fuhrmann, and Michael Horowitz, “Do Armed Drones Counter Terrorism, Or Are They Counterproductive? Evidence from Eighteen Countries,” *International Studies Quarterly*, [Link](#), Only pages 2-4.
 - Aqil Shah, “Drone Blowback: Much Ado about Nothing?” *Lawfare*, [Link](#), 4 pages.
 - Avery Plaw and Matthew S. Fricker, “Tracking the Predators: Evaluating the US Drone Campaign in Pakistan,” *International Studies Perspectives* (2012), [Link](#), Only pages 350-354.
- Discussion Questions
 - What are the mechanisms explaining why drones may increase terrorism? What are the mechanisms explaining why drones may reduce terrorism?
 - Which perspective do you find more compelling?
 - Do you think the use of drones is ethically justified? Are there more and less ethical ways to use drones for the purpose of countering terrorism?
 - From a policy perspective, to what extent should the United States employ drones to counter terrorism? Are drones a sufficient substitute for large-scale ground operations to counter terrorism? Do they provide a strong or weak rationale for withdrawing from Afghanistan?
 - How do drones relate to our previous discussions about gender, offense-defense theory, lethal empowerment theory, strategic bombing, adoption-capacity theory, status-seeking, debates about whether a revolution in military affairs has occurred, and the modern system?

November 14: Social Media, Foreign Electoral Intervention, and Corporate Espionage

- Guest Speaker: [Jon Schlegel](#)
 - Global Chief Information Security Officer, DuPont
 - Former Cyber National Mission Force Deputy Commander
 - Former Director of Operations for the Counter Cyber Intelligence Office, National Security Agency
 - Former Program Manager of the Signals Intelligence Directorate, National Security Agency
- Assignment: Post two questions for Jon on Canvas under the “Discussions” section (see [here](#)).

- Suggested Reading (Not Required)
 - Dov H. Levin, “When the Great Power Gets a Vote: The Effects of Great Power Electoral Interventions on Election Results,” *International Studies Quarterly*, [Link](#), 13 pages.
 - Michael Tomz and Jessica L.P. Weeks, “Public Opinion and Foreign Electoral Intervention,” *American Political Science Review*, [Link](#), 16 pages.
 - Zach Dorfman, “Why Russia Will Keep Poking America’s Racial Wounds,” *Axios*, [Link](#), [Access online \(pdf not available\)](#), 2 pages.
 - Gregory Eady et al., “Exposure to the Russian Internet Research Agency Foreign Influence Campaign on Twitter in the 2016 US Election and its Relationship to Attitudes and Voting Behavior,” *Nature*, [Link](#), 9 pages.
- Discussion Questions
 - Do you agree with the two conditions Levin lays out for when electoral interventions are most likely to occur? Is his analysis of the effectiveness of those interventions historically convincing?
 - To what extent do you believe Russian intervention in the 2016 election was successful or unsuccessful? To what extent does Eady et al.’s paper settle the debate?
 - Does the existence of social media make it easier for countries to engage in electoral intervention? Does it make it easier for them to do so *successfully*?
 - Do you think it’s ever appropriate for the United States to intervene in another country’s electoral process? If so, under what conditions?
 - To what extent should the United States be willing to retaliate in response to meddling in its own elections? Should the US have responded more strongly to Russia’s intervention in the 2016 election?
 - To what extent should the government regulate social media to reduce the effects of misinformation/disinformation campaigns? Do social media companies have an obligation to do so themselves? If so, then at what cost to their bottom line?

November 19: The Cyber Revolution and Debates Between Policymakers and Academics About How Transformational It Is

- Guest Speaker: [Nadiya Kostyuk](#), Assistant Professor at the Carnegie Mellon Institute for Strategy and Technology
- Big Question: When do we know that the character of war has been changed forever by the introduction of a new set of technologies?
- Required Reading
 - Lucas Kello, “The Meaning of the Cyber Revolution,” *International Security* (2013), [Link](#), [Only pages 27-32](#).
 - Jon R. Lindsay, “Stuxnet and the Limits of Cyber Warfare,” *Security Studies*, [Link](#), 40 pages.
 - Erica D. Lonergan, “The Cyber-Escalation Fallacy: What the War in Ukraine Reveals About State-Backed Hacking,” *Foreign Affairs*, [Link](#), 11 pages.
- Discussion Questions
 - What are the arguments of those that believe a cyber revolution has occurred and is/will transform warfare?
 - What are the arguments of those that are skeptical about the impact operations in the cyber domain will have on conflict?
 - How do these arguments relate to our discussion of offense-defense theory?

- Which perspective do you believe the Stuxnet cyber attack supports? What about Russia's cyber operations in Ukraine?
- How important do you believe the cyber domain is relative to other domains we have discussed in class, such as the air and sea domain?
- Thinking back to our discussion of dynamite and lethal empowerment theory, how concerned should US policymakers be about non-state actors leveraging cyber to conduct attacks?
- NO Quiz

November 21: Outline of Long-Form Essay Due and Peer Review Day

- Required Reading: None

November 26: NO CLASS (Thanksgiving Travel)

November 28: NO CLASS (Thanksgiving)

December 3: Lethal Autonomous Weapons Systems and Debates About Whether They Are an Ethical Abomination or a Moral Imperative

- Big Question: Are there some weapons that states should refuse to use even if they have military utility on the battlefield?
- Required Reading
 - Campaign to Stop Killer Robots, "Problems with Autonomous Weapons," [Link](#), a few pages.
 - Zachary Fryer-Biggs, "Can Computer Algorithms Learn to Fight Wars Ethically?" *Washington Post*, [Link](#), 15 pages.
 - Ronald C. Arkin, "The Case for Ethical Autonomy in Unmanned Systems," *Journal of Military Ethics* (2010), [Link](#), Only pages 332-336.
 - Hitoshi Nasu and Christopher Korpela, "Stop the 'Stop the Killer Robot' Debate: Why We Need Artificial Intelligence in Future Battlefields," *Council on Foreign Relations* (2022), [Link](#), 4 pages.
 - Thomas X. Hammes, "Autonomous Weapons Are the Moral Choice," *Atlantic Council* (2023), [Link](#), 3 pages.
 - Kevin Jon Heller, "The Concept of 'The Human' in the Critique of Autonomous Weapons," *Harvard National Security Journal* (2023), [Link](#), Only pages 6-8, bottom of 14-18, and 20-41.
- Discussion Questions
 - What are the arguments that lethal autonomous weapons systems (LAWS) are unethical? Especially those related to algorithmic biases and a lack of accountability.
 - What are the arguments that LAWS are ethical? In particular, why might LAWS actually reduce the incidence of civilian casualties compared the use of force more directly by humans?
 - To what extent are LAWS already used by the United States and other countries?

- Even if we stipulate LAWS are unethical, should they still be developed and (potentially) used for strategic reasons?
- Is killing with LAWS or by remote control from a distance more ethically problematic?

December 5: What We've Learned — The Highlights

- Required Reading: None

Questions to Ask When Evaluating Theories

- Are the concepts and variables in the theory defined clearly?
- Are the factors in the theory necessary and/or sufficient conditions for certain outcomes to occur?
- Does the author explain the *logic* of why X causes Y? Do you buy it? Are there alternative mechanisms explaining why X causes Y that the author doesn't consider?
- Does the author consider the counterfactual? If so, then does the author use counterfactuals effectively? If not, consider them yourself.
- Is the causal claim falsifiable? In other words, is there evidence that you could realistically find that would disprove the theory?
- Are there historical examples that do not conform to the author's argument? Would the theory hold in other contexts (e.g., time periods, countries, etc.)?
- What factors make the theory more and less likely to hold?
- Does the author consider rival explanations and treat them fairly?
- Might there be omitted variables bias? That is, could there be a variable correlated with both the independent and dependent variables of a theory that's the real cause?
- Could there be reverse causation? Might Y cause X rather than the other way around?

News Resources to Follow International Security Current Events

- [Foreign Affairs](#)
- [War on the Rocks](#)
- [Foreign Policy](#)
- [Bulletin of the Atomic Scientists](#)
- [Lawfare](#)

Respect, Diversity, and Inclusion

I am committed to ensuring that my classroom is a friendly and inclusive learning environment that will serve students from all diverse backgrounds and perspectives. Although I encourage rigorous debate, you should always treat each other with respect, and I commit to doing so as well. The diverse perspectives, areas of expertise, and lived experiences we bring to the classroom is something I view as a great strength that will help facilitate learning. I do not permit bullying or harassment under any circumstances. Do not hesitate to reach out to me with any concerns you may have, and there will never be any backlash of retaliation permitted for raising concerns. CMU also offers resources through the [Center for Student Diversity and Inclusion](#).

Learning Resources Offered by CMU

CMU offers various programs via the [Student Academic Success Center](#) to support student learning outside the traditional course structure.

Mental Health Resources Offered by CMU

Taking care of your mental health, in addition to your physical health, is critically important. If you're struggling with anxiety, depression, or anything else, then I'd urge you to seek support. CMU offers [Counseling and Psychological Services](#) (CaPS). Visit their website or call them at 412-268-2922 for 24/7 support. You can also call the Re:solve Crisis Network at 888-796-8226 or the National Suicide Prevention Lifeline at 800-273-8255.

Accommodations for Students with Disabilities

If you have a disability and have an accommodations letter from the Disability Resources office, I encourage you to discuss your accommodations and needs with me as early in the semester as possible. I will work with you to ensure that accommodations are provided as appropriate. If you suspect that you may have a disability and would benefit from accommodations but are not yet registered with the [Office of Disability Resources](#), I encourage you to contact them at access@andrew.cmu.edu.

Academic Integrity

Academic dishonesty will not be tolerated because it is antithetical to learning. See CMU's [Policy on Academic Integrity](#) for more information.

Policy on the Use of Artificial Intelligence for Assignments

Just as the internet revolutionized how students completed their assignments, generative artificial intelligence (GAI) tools—such as ChatGPT—are likely to do the same. For that reason, I don't believe a blanket ban on the use of GAI in this class is appropriate. In my view, we need to learn how to most effectively use these tools to enhance learning rather than ban them. Therefore, you may feel free to use ChatGPT to generate ideas for assignments or conduct research, *but you must cite your use of it, or it will be considered academic misconduct*. I would also strongly caution you against relying too much on ChatGPT, as it is quite prone to misstating academic arguments and historical events, as well as making up sources. While you may use ChatGPT to generate ideas or conduct research (as long as you cite it), *your writing must be your own*. Do not use ChatGPT to write your essay or memo, or that will be considered academic misconduct.

Respondus LockDown Browser

This course requires the use of LockDown Browser for online exams. Watch this video to get a basic understanding of LockDown Browser:

<https://www.respondus.com/products/lockdown-browser/student-movie.shtml>

Download Instructions

- Select a quiz from the course (I've posted an ungraded practice quiz on Canvas)

- If you have not already installed LockDown Browser, select the link to download the application and follow the installation instructions
- Return to the quiz page in a standard browser
- LockDown Browser will launch and the quiz will begin