

Democracy Hacked: Cyber Threats to Modern Governments in the Digital Age

Instructor: Jake Braun

PPHA 33820

Spring Quarter 2020

Monday 2:00-4:50 PM CT

Room TBD

Introduction:

A secure election, supported by voters' confidence that every vote will be counted as cast, forms the bedrock of our democracy. However, as evidenced in the 2016 election, U.S. voting systems have become a serious national security concern. Given the recent cyber interference by a foreign adversary, the matter of "securing the vote" – something that was once almost exclusively the responsibility of state and local officials – has now become a priority of our nation's top cybersecurity, homeland security, military, law enforcement, and intelligence leaders.

Americans may be under the false impression that an attack on our vote counting systems would be detected because of reassurances by U.S. government agencies that they were not compromised in 2016, but this optimistic assessment is not based on actual examination of those systems. And the United States is not alone in its vulnerabilities: As more governments do business online, there are more opportunities for states' adversaries to usurp democratic power from citizens.

As we look forward to the upcoming Presidential election, we must expect future, potentially devastating attacks on our voting systems. They are irresistible targets for attackers to attempt to manipulate in order to "elect" the leaders of their choice. In addition to Russia, many other groups, including North Korea, Iran, ISIS, China, and large foreign and domestic crime rings, have the resources to successfully attack our current voting systems. In fact, when asked whether Russia would attempt to attack future U.S. elections, as it did in 2016, Robert Mueller replied in his testimony before the House Judiciary Committee that "they're doing it as we sit here." We urgently need to secure our election systems from attack.

Course Description:

This course is designed to offer students an overview of the current cybersecurity landscape and the implications for protecting and promoting democracy. Students will hear first-hand insider perspectives from public and private sector cyber professionals and international experts on democratic engagement and protection of civil liberties. Students will gain insight on cybersecurity technology, threats to democratic institutions, and ways to combat cyber predators.

Class Structure:

Each class will begin with a discussion of the week's readings. Students should expect to come to class prepared to discuss and ask questions about the assigned readings. Additionally, each week students will research and come prepared to discuss an issue related to election security.

Projects/Exams

- Response and Analysis Briefs (2)
 - Each student will submit two two-page policy briefs that provide a summary and analysis of the information gleaned from assigned readings. These papers will be submitted (electronic and hard copy versions) on the following dates:
 - Brief #1: Monday, April 20, 2020
 - Brief #2: Monday, May 11, 2020
- Final Research Project
 - The final project will be a comprehensive report on a topic related to election security. For the project, students will draw on knowledge gained from the topics covered during the quarter. The paper should be five pages long and should be submitted electronically by Monday, June 8, 2020.

Week 1: March 30

Topic: Democracy and Cybersecurity: The Scale of the Problem

- Review syllabus and final project
- Defining "cybersecurity" from the technical and policy perspectives
- Current cybersecurity policies
- Elections 2016: What happened?

Week 2: April 6

Topic: The Basics of Cybersecurity: The Top 20 Critical Security Controls

Speaker: Tony Sager, Senior Vice President & Chief Evangelist, Center for Internet Security; former Chief Operating Officer of the National Security Agency Information Assurance Directorate

Readings:

Top 20 Critical Security Controls

<http://www.sans.org/critical-security-controls/control/3>

Top 4 Critical Security Controls

<http://www.tripwire.com/state-of-security/security-data-protection/top-four-critical-security-controls/>

NEW POTENTIAL ARTICLES:

2019 CIS 20 Critical Security Controls

<https://www.cisecurity.org/controls/>

Overview of above via Infosec

<https://resources.infosecinstitute.com/the-center-for-internet-security-cis-top-20-critical-security-controls/#gref>

“ Via Tripwire

<https://www.tripwire.com/state-of-security/security-data-protection/security-controls/cis-top-20-critical-security-controls/>

Cybersecurity

<https://www.dhs.gov/cisa/cybersecurity>

Reducing Cyber Risk to Critical Infrastructure: NIST Framework

<https://www.energy.gov/oe/cybersecurity-critical-energy-infrastructure/reducing-cyber-risk-critical-infrastructure-nist>

(Maybe not a source you're looking for)

The Top Five Cyber Security Vulnerabilities

<https://resources.infosecinstitute.com/the-top-five-cyber-security-vulnerabilities-in-terms-of-potential-for-catastrophic-damage/#gref>

(Just in case this is the level of explanation needed)

Cybersecurity Explained to your Grandparents

<https://medium.com/station-f/cybersecurity-explained-to-your-grandparents-7c005808b338>

Cyber Security Glossary

<https://www.cybrary.it/glossary/>

Week 3: April 13

Topic: Current State of “Security” in the US Voting System

Speaker: Harri Hursti, Founding Partner, Nordic Innovation Labs

Readings:

DEF CON 25 Voting Machine Hacking Village Report

By Matt Blaze, Jake Braun, Harri Hursti, Joseph Lorenzo Hall, Margaret MacAlpine, and Jeff Moss

<https://www.defcon.org/images/defcon-25/DEF%20CON%2025%20voting%20village%20report.pdf?data1=v1>

Tensions Flare as Hackers Root Out Flaws in Voting Machines

By Robert McMillan and Dustin Volz

<https://www.wsj.com/articles/tensions-flare-as-hackers-root-out-flaws-in-voting-machines-1534078801>

Election-Hacking Lessons From the 2018 DEF CON Hackers Conference

By Sue Halpern

<https://www.newyorker.com/news/dispatch/election-hacking-lessons-from-the-2018-def-con-hackers-conference>

Which voting machines can be hacked through the Internet?

By Andrew Appel

<https://freedom-to-tinker.com/2016/09/20/which-voting-machines-can-be-hacked-through-the-internet/>

NEW POTENTIAL ARTICLES:

DEF CON 27 Voting Machine Hacking Village Report

Election Security | Cybersecurity: What Legislators (and Others) Need to Know:

<http://www.ncsl.org/research/elections-and-campaigns/election-security.aspx>

#DEFCON: How the US's CISA Works to Improve Election Security

<https://www.infosecurity-magazine.com/news/defcon-cisa-improve-election/>

States and localities are on the front lines of fighting cyber-crimes in elections

<https://www.brookings.edu/blog/fixgov/2019/08/15/states-and-localities-are-on-the-front-lines-of-election-security/>

Election Security

<https://www.dhs.gov/topic/election-security>

U.S. Elections Are Still Vulnerable to Foreign Hacking

<https://www.brennancenter.org/blog/us-elections-are-still-vulnerable-foreign-hacking>

FIRST BRIEF DUE NEXT WEEK

Week 4: April 20

Topic: Cyber Threats to Democracy: Russia and the Geopolitical Landscape

Speaker: Ambassador Douglas Lute, Robert F. McDermott Distinguished Chair of Social Sciences, United States Military Academy at West Point; former US Ambassador to NATO

Readings:

U.S. NATO Envoy Warns Of Russian 'Malign Influence' Ahead Of Talks

<https://www.rferl.org/a/us-envoy-nato-russia-council-influence-cyberattacks/28183839.html>

Everything We Know About Russia's Election-Hacking Playbook

By Andy Greenberg

<https://www.wired.com/story/russia-election-hacking-playbook/>

A Guide to Russia's High Tech Tool Box for Subverting US Democracy

By Garrett M. Graff

<https://www.wired.com/story/a-guide-to-russias-high-tech-tool-box-for-subverting-us-democracy/>

The US Gives Cyber Command the Status It Deserves

By Lily Hay Newman

<https://www.wired.com/story/cyber-command-elevated/>

NEW POTENTIAL ARTICLES:

State election offices made for an easy target for Russian hackers

<https://www.fifthdomain.com/critical-infrastructure/2019/07/29/state-election-offices-made-for-an-easy-target-for-russian-hackers/>

Senate Intelligence Committee releases first volume of its investigation into Russian election hacking

<https://techcrunch.com/2019/07/25/senate-intelligence-committee-releases-first-volume-of-its-investigation-into-russian-election-hacking/>

Read the Mueller Report: Searchable Document and Index

<https://www.nytimes.com/interactive/2019/04/18/us/politics/mueller-report-document.html>

We hired the author of 'Black Hawk Down' and an illustrator from 'Archer' to adapt the Mueller report so you'll actually read it

<https://www.insider.com/mueller-report-rewritten-trump-russia-mark-bowden-archer-2019-7>

FIRST BRIEF DUE TODAY

Week 5: April 27

Topic: Improving Election Security for Residents of Cook County

Speaker: Director of Elections, Cook County, Illinois

Readings:

2020 Vision: Election Security in the Age of Committed Foreign Threats

By Noah Praetz

https://mma.prnewswire.com/media/617112/DEFCON_Voting_Village_Report.pdf

Many County Elections Officials Still Lack Cybersecurity Training

By Likhitha Butchireddygari

<https://www.nbcnews.com/politics/national-security/voting-prep-n790256>

Securing Elections as Critical Infrastructure

National Association of Secretaries of State

<http://www.nass.org/index.php/nass-initiatives/nass-cybersecurity-elections-critical-infrastructure/>

Election Commission Wants to Work With DHS on Election Cybersecurity

By Joseph Marks

<http://www.nextgov.com/cybersecurity/2017/08/election-commission-wants-work-dhs-election-cybersecurity/140296/>

NEW POTENTIAL ARTICLES:

Election Security and Large Counties

https://link.springer.com/chapter/10.1007/978-3-030-18541-1_23

Election security in 2020 means a focus on county officials, DHS says

<https://www.cnet.com/news/election-security-in-2020-means-a-focus-on-county-officials-dhs/>

A Voter's Guide to Election Security

<https://www.pewtrusts.org/en/research-and-analysis/blogs/stateline/2018/11/01/a-voters-guide-to-election-security>

White Paper | 2020 Vision: Election Security in the Age of Committed Foreign Threats

https://www.cookcountyclerk.com/sites/default/files/pdfs/Election%20Security%20White%20Paper_Praetz_12062017_0.pdf

3 years after Russian hackers tapped Illinois voter database, officials spending millions to safeguard 2020 election

<https://www.chicagotribune.com/politics/ct-illinois-election-security-russian-hackers-20190805-qtoku33szjdrhknwc7pxbu6pvq-story.html>

The Unsexy Threat to Election Security

<https://krebsonsecurity.com/2019/07/the-unsexy-threat-to-election-security/>

Week 6: May 4

Topic: Technical Vulnerabilities in the US Election System

Speaker: Sherri Ramsay, Senior Advisor to the CEO, CyberPoint International; Advisor, Cambridge Global Advisors

Readings:

Voting System Security and Reliability Risks

Brennan Center for Justice

https://www.brennancenter.org/sites/default/files/analysis/Fact_Sheet_Voting_System_Security.pdf

The Perfect Weapon: War, Sabotage, and Fear in the Cyber Age

By David Sanger

NEW POTENTIAL ARTICLES:

Election Security: Voting Technology Vulnerabilities

<https://www.nist.gov/speech-testimony/election-security-voting-technology-vulnerabilities>

The Vulnerabilities of Our Voting Machines

<https://www.scientificamerican.com/article/the-vulnerabilities-of-our-voting-machines/>

ELECTION SECURITY: VOTING TECHNOLOGY VULNERABILITIES

<https://science.house.gov/imo/media/doc/Kelley%20Testimony.pdf>

Critical U.S. Election Systems Have Been Left Exposed Online Despite Official Denials

https://www.vice.com/en_us/article/3kxzk9/exclusive-critical-us-election-systems-have-been-left-exposed-online-despite-official-denials

Our Voting System Is Hackable. Here's How to Secure It

<https://singularityhub.com/2018/11/04/our-voting-system-is-fragile-can-tech-help/>

The scramble to secure America's voting machines

<https://www.politico.com/interactives/2019/election-security-americas-voting-machines/>

Election Systems Across Country Use Software Vulnerable To Hackers

https://www.huffpost.com/entry/election-systems-across-country-use-software-vulnerable-to-hackers_n_5d2b6ee1e4b02a5a5d5cb0e4?guccounter=1&guce_referrer=aHR0cHM6Ly93d3cuZ29vZ2xlLmNvbS8&guce_referrer_sig=AQAAACbORCI0WPdZPgf3_PHOey5eg3befJEQ6kNQTixQr3pTuisXEINutXncux8fX8s9XDOABz5FVum3FJ2AJpxL8y3rXEgq2CVerBY_t-ozBc3cNk9IPtM5ZPhW5CWGvdhGmHZpaEE69CJ1KDBowV4Ms-hKCkk-sSTHGEuiAuGtuKvZ

SECOND BRIEF DUE NEXT WEEK

Week 7: May 11

Topic: The Future of e-Government

Speaker: TBA

Readings:

Estonia's advance towards an e-state also brings about a new challenge in foreign policy

By Luukas Ilves

<https://www.diplomaatia.ee/en/article/e-estonian-foreign-policy/>

Luukas Ilves on the Digital Priorities for the Estonian Presidency

Video

<https://www.euractiv.com/section/digital/video/luukas-ilves-counsellor-for-digital-affairs-permanent-representation-of-estonia-to-the-eu-on-the-digital-priorities-for-the-estonian-presidency/>

How Estonia is Leading the Way for Business and Technology Startups

By James Conroy

<http://irishtechnews.ie/how-estonia-is-leading-the-way-for-business-and-technology-startups/>

NEW POTENTIAL ARTICLES:

Estonia is running its country like a tech company

<https://qz.com/1535549/living-on-the-blockchain-is-a-game-changer-for-estonian-citizens/>

e-Residency 2.0 White Paper

<https://s3.eu-central-1.amazonaws.com/ereswhitepaper/e-Residency+2.0+white+paper+English.pdf>

Digital citizens: an interview with Estonia's e-Residency chief, Ott Vatter

<https://www.globalgovernmentforum.com/digital-citizens-an-interview-with-estonias-e-residency-chief-ott-vatter/>

Vision of future e-government via new e-government maturity model: Based on Korea's e-government practices

<https://www.sciencedirect.com/science/article/abs/pii/S0308596117302884>

The Future of Digital Government

<https://viderity.com/2018/10/09/the-future-of-digital-government/>

e-Government: Background, Today's Implementation and Future Trends

https://link.springer.com/chapter/10.1007/978-3-030-01596-1_5

Lessons from Estonia on Digital Government

<https://policyoptions.irpp.org/magazines/february-2019/lessons-estonia-digital-government/>

Estonia's digital transformation: Mission mystique and the hiding hand

https://www.ucl.ac.uk/bartlett/public-purpose/sites/public-purpose/files/iipp-wp-2018-09_estonias_digital_transformation.pdf

Is Estonia the Silicon Valley of digital government?

<https://medium.com/iipp-blog/is-estonia-the-silicon-valley-of-digital-government-bf15adc8e1ea>

Email and Internet Voting: The Overlooked Threat to Election Security

<https://www.commoncause.org/page/email-and-internet-voting-the-overlooked-threat-to-election-security/>

Security Analysis of the Estonian Internet Voting System

http://delivery.acm.org/10.1145/2670000/2660315/p703-springall.pdf?ip=76.121.190.123&id=2660315&acc=OA&key=4D4702B0C3E38B35%2E4D4702B0C3E38B35%2E4D4702B0C3E38B35%2E638B5282305ABE89&__acm__=1566377145_1e503a78671c825e2cfed7c3539b4d88

Internet Voting in Comparative Perspective: The Case of Estonia

<https://www.cambridge.org/core/journals/ps-political-science-and-politics/article/internet-voting-in-comparative-perspective-the-case-of-estonia/8A8BCDACE0F361D1623D6F013025E624>

Online-only voting? Don't do it, experts say in report on America's election security

<https://www.geekwire.com/2018/online-voting-dont-experts-say-report-americas-election-system-security/>

What the U.S. Can Learn About Electronic Voting From This Tiny Eastern European Nation

<https://time.com/5541876/estonia-elections-electronic-voting/>

Moscow's blockchain voting system cracked a month before election

<https://www.zdnet.com/article/moscows-blockchain-voting-system-cracked-a-month-before-election/>

SECOND BRIEF DUE TODAY

Week 8: May 18

Topic: Elections 2016: What We Know Now and What to Do About It

Speaker: General Francis X. Taylor, former Under Secretary for Intelligence and Analysis at the U.S. Department of Homeland Security

Readings:

Cybersecurity Lessons From the 2016 Presidential Election

By Rick M. Robinson

<https://securityintelligence.com/cybersecurity-lessons-from-the-2016-presidential-election/>

Written testimony of NPPD Office of Cybersecurity and Communications Assistant Secretary Andy Ozment for a House Committee on Oversight and Government Reform, Subcommittee on Information Technology hearing titled "Cybersecurity: Ensuring the Integrity of the Ballot Box"
U.S. Department of Homeland Security
<https://www.dhs.gov/news/2016/09/28/written-testimony-nppd-house-oversight-and-government-reform-subcommittee>

President's Executive Order Will Strengthen Cybersecurity for Federal Networks and Critical Infrastructure
U.S. Department of Homeland Security
<https://www.dhs.gov/news/2017/05/11/president-s-executive-order-will-strengthen-cybersecurity-federal-networks-and>

Mueller Report

NEW POTENTIAL ARTICLES:

2020 election security to face same vulnerabilities as in 2016
<https://searchsecurity.techtarget.com/news/252468837/2020-election-security-to-face-same-vulnerabilities-as-in-2016>

Republicans are still blocking election security bills after Mueller's testimony
<https://www.vox.com/2019/5/21/18629428/election-security-mitch-mcconnell-donald-trump-russia>

S.1540 - Election Security Act of 2019
<https://www.congress.gov/bill/116th-congress/senate-bill/1540/text>

Election Security
<https://www.politico.com/2020-election/candidates-views-on-the-issues/cyber-security/election-security/>

The Cybersecurity 202: Here's the political bind Democrats face when talking about election security
<https://www.washingtonpost.com/news/powerpost/paloma/the-cybersecurity-202/2019/08/13/the-cybersecurity-202-here-s-the-political-bind-democrats-face-when-talking-about-election-security/5d51712d602ff1306728b142/>

America Needs Paper-Based Ballots for the 2020 Election
<https://fortune.com/2019/08/10/america-needs-paper-based-ballots-for-the-2020-election-cyber-saturday/>

Week 9: May 27

Topic: Cybersecurity Policy and International Norms

Speaker: TBA

Readings:

A Civil Perspective on Cybersecurity

By Jane Holl Lute and Bruce McCall

<http://www.wired.com/2011/02/dhs-op-ed/>

Defending a New Domain

By William Lynn

<http://www.foreignaffairs.com/articles/66552/william-j-lynn-iii/defending-a-new-domain>

Working to Preserve the Stability of Cyberspace

By Paul Nicholas

<https://thediplomat.com/2017/09/working-to-preserve-the-stability-of-cyberspace/>

NEW POTENTIAL ARTICLES:

Cyber Stability Conference Strengthening Global Engagement 2019 Summary Report

<http://unidir.org/files/medias/pdfs/cyber-stability-conference-2019-summary-report-eng-0-849.pdf>

The Application of International Law in Cyberspace: State of Play

<https://www.un.org/disarmament/update/the-application-of-international-law-in-cyberspace-state-of-play/>

In Cyberwar, There are No Rules

<https://foreignpolicy.com/2018/09/12/in-cyberwar-there-are-no-rules-cybersecurity-war-defense/>

Thirteenth Meeting of Internet Governance Forum Paris, 12-14 November 2018: IGF 2018 Chair's Summary

https://www.intgovforum.org/multilingual/index.php?q=filedepot_download/6212/1417

Cybersecurity Legislation 2018

<http://www.ncsl.org/research/telecommunications-and-information-technology/cybersecurity-legislation-2018.aspx>

National Cyber Strategy of the United States of America

<https://www.whitehouse.gov/wp-content/uploads/2018/09/National-Cyber-Strategy.pdf>

Moving the needle on cyber norms

<https://fcw.com/articles/2019/02/01/cyber-norms-needle.aspx>

*UN General Assembly adopts record number of resolutions on internet governance and policy:
Mixed outcomes for human rights online*

<https://www.apc.org/en/news/un-general-assembly-adopts-record-number-resolutions-internet-governance-and-policy-mixed>

A Farewell to Norms

<https://www.internetgovernance.org/2018/09/04/a-farewell-to-norms/>

Week 10: June 1

Topic: The Dark Tangent: A Hacker's View of Cyber Policy

Speaker: Jeff Moss, Founder, DEF CON

Readings:

Voting Machine Hackers Have 5 Tips to Save the Next Election

By Carsten Schurmann and Jari Kickbusch

<https://www.wired.com/story/voting-machine-hackers-5-tips/>

To Fix Voting Machines, Hackers Tear Them Apart

By Lily Hay Newman

<https://www.wired.com/story/voting-machine-hacks-defcon/>

Political campaigns prep for battle with hackers

By Daniel Strauss and Scott Bland

<http://www.politico.com/story/2017/09/19/hackers-political-campaigns-242863>

Suggested Reading:

The Cuckoo's Egg - Cliff Stoll

Lifting The Fog Of War - Admiral Bill Owens

Neuromancer - William Gibson

Snow Crash - Neal Stephenson

Democracy in Danger - Jake Braun

NEW POTENTIAL ARTICLES:

Hackers were told to break into U.S. voting machines. They didn't have much trouble.

<https://www.washingtonpost.com/business/2019/08/12/def-con-hackers-lawmakers-came-together-tackle-holes-election-security/>

Judge Blasts Georgia Officials' Handling of Election System

<https://time.com/5654788/judge-georgia-election-system/>

The malware election: Returning to paper ballots only way to prevent hacking

<https://thehill.com/opinion/technology/457869-the-malware-election-returning-to-paper-ballots-only-way-to-secure>