

CPSC 310 and CPSC 210 // PLSC 369: Syllabus v1

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Twenty-first century societies are faced with both threats and opportunities that combine sophisticated computation with politics and international relations in critical ways. Examples include cyber warfare; cyber espionage; cyber crime; the role of social media in democratic self-governance, authoritarian control, and election "hacking"; cryptocurrencies; and mass surveillance. CPSC 310 and CPSC 210 // PLSC 369¹ examine some of the political challenges wrought by massive increases in the power of information and communication technologies and the potential for citizens and governments to harness those technologies to solve problems. They are co-taught by Professors Joan Feigenbaum (Computer Science) and Steven Wilkinson (Political Science).

The two courses will have common lectures but separate sections. The CPSC 310 section is aimed at STEM students and has CPSC 223 or the equivalent as a prerequisite. The CPSC 210 // PLSC 369 section is aimed at social-science students and has no formal course prerequisites (but assumes Internet literacy).

Students may earn credit for CPSC 310 or for CPSC 210 // PLSC 369 but not both. The TF for CPSC 310 is Samuel Judson (CPSC) samuel.judson@yale.edu, and the TF for CPSC 210 // PLSC 369 is John Ternovski (PLSC) john.ternovski@yale.edu.

The two courses will have common reading assignments. There will also be four written homework assignments, each worth 15% of the course grade, two due before mid-term break and two due after. In CPSC 310, the homework assignments will be problem sets, and, in CPSC 210 // PLSC 369, they will be short response papers based on the reading. In addition, students in both courses will take the same in-class exams, each worth 20% of the course grade, on one February 28 and the other on April 25. There will be no final during exam period.

¹ "Power, Security, and Surveillance: Political Challenges of the Computer Age" is cross-titled in two departments as CPSC 210 and PLSC 369. It is one course that has two numbers. CPSC 310, which has a similar name, is a different course.

Preliminary schedule and reading assignments (subject to revision)

Jan 15: Course overview (Feigenbaum, Wilkinson)

- Administrative matters, including novel course structure.
- Brief “teaser” lecture on a representative topic: lawful surveillance vs. ubiquitous encryption.

Jan 17: Internet basics (Feigenbaum)

- Required reading:
 - [“Networks: How the Internet Works.”](#) by Scott Bradner
 - [“Rethinking the Design of the Internet: The End-to-End Arguments vs. The Brave New World.”](#) by Marjory S. Blumenthal and David D. Clark
 - [“Degrees of Freedom, Dimensions of Power.”](#) by Yochai Benkler
- Optional reading (technically oriented):
 - [“The Design Philosophy of the DARPA Internet Protocols.”](#) by David D. Clark
 - [“End-to-End Arguments in System Design.”](#) by Jerry H. Saltzer, David P. Reed, and David D. Clark
 - [“A History and Future of Web APIs.”](#) by Jacek Kopecky, Paul Fremantle, and Rich Boakes. This paper addresses one of the technological enablers of Internet re-centralization.

Jan 22: Crypto and security basics (Feigenbaum)

- Required reading:
 - [“A Brief Introduction to Information Security.”](#) by Rainer Bohme and Tyler Moore. This paper contains some material about Internet architecture that will be familiar from the last reading assignment, but most of the paper is about information-security technology.
- Optional reading:
 - [“Cryptography -- Main Topics.”](#) by Oded Goldreich. Students who are not fully satisfied by Bohme and Tyler’s explanation of cryptography should read this short overview.
 - [“The Moral Character of Cryptographic Work.”](#) by Phillip Rogaway

Jan 24: Computers, Social Media and Democracy (Wilkinson)

- Cass R Sunstein, *#Republic: Divided Democracy in the Age of Social Media* (Princeton : Princeton University Press, 2017) Chapters 1, 3, and 4 (Yale Online Book)

- Swire B, Berinsky, A.J., Lewandowsky S., Ecker U. K. H., “Processing political misinformation: comprehending the Trump phenomenon” *R.Soc.opensci* (2017) 4:160802. <http://dx.doi.org/10.1098/rsos.160802>.

Optional

- Berinsky, “[Rumors and Health Care Reform: Experiments in Political Misinformation](#)” *British Journal of Political Science*. 2017. 47(2): 241-262

Jan 29: Political Disinformation in the USA (Wilkinson)

- Yochai Benkler, Robert Faris and Hal Roberts, *Network Propaganda: Manipulation, Disinformation and Radicalization in American Politics* (Oxford: Oxford University Press, 2018), Ch.10 Polarization in American Politics and Chapter 11 “The origins of asymmetry.” (Yale Online Book).
- Kathleen Hall Jamieson, *Cyber-War: How Russian Hackers and Trolls Helped Elect a President* (Oxford, 2018), pp.153-213. Course Reserves.

Jan 31: Disinformation in the 2016 US election, incl. the role of FB (Feigenbaum)

- [“What Facebook Did to American Democracy And why it was so hard to see it coming.”](#) by Alexis C. Madrigal
- [Mueller indictment of the Russian Internet Research Agency and its employees](#) Paragraphs 1-7, 28-58, and 86-97 of the indictment are required reading; the rest is optional.
- [“The Russian Influence Campaign: What’s in the Latest Mueller Indictment.”](#) by Sarah Grant *et al.*

Feb 5: Voting and Vote Fraud in the Electronic Age-An Introduction (Wilkinson)

- Roy G. Saltman, *The history and politics of voting technology: in quest of integrity and public confidence*, Palgrave 2006. Chapter 6 “The Middle and Late Twentieth Century,” pp. 155-85. Yale Online Book.

Feb 7: Can EVM fraud be prevented? India and EVMs (Wilkinson & Feigenbaum)

- Hari K. Prasad, [J. Alex Halderman, Rop Gonggrijp](#), “India’s EVMs are vulnerable to fraud,” <https://indiaevm.org/>;
- Halderman, Prasad, Gonggrip et al, “Security Analysis of India’s Electronic Voting Machines,” CCS’10, October 4–8, 2010, Chicago, Illinois, USA. <https://jhalderm.com/pub/papers/evm-ccs10.pdf>
- ECI’s June 2017 EVM Tampering Context
- <https://www.ndtv.com/video/news/news/election-commission-s-evm-challenge-next-month-conditions-apply-457728>

- “AAP demands use of paper ballots in 2019 Lok Sabha elections,” <https://www.ndtv.com/india-news/aap-demands-use-of-ballot-papers-in-2019-lok-sabha-elections-1889804>.

Feb 12: Privacy (or lack thereof) in the Internet Age (Feigenbaum)

- [“Reconciling Personal Information in the United States and the European Union.”](#) by Paul M. Schwartz and Daniel J. Solove

Feb 14: Technology, authoritarianism, and surveillance, incl China, part I (Wilkinson); internet censorship; the great internet wall; surveillance and control and China’s 2020 national surveillance network target (*xueliang*, or “sharp eyes”) as laid out in

- National Development and Reform Commission, *Development and Reform High Technology* [2015] No. 996. Canvas.
- Mary Gallagher and Blake Miller, “The Progression of repression,” 2017. Canvas.
- Wang, Y. (2016a, March). The business of censorship: Documents show how weibo filters sensitive news in china. Retrieved from <https://web.archive.org/web/20161003182432/https://cpj.org/blog/2016/03/the-business-of-censorship-documents-show-how-weib.php>
- Wang, Y. (2016b, March). Read and delete: How weibo's censors tackle dissent and free speech. Retrieved from <https://web.archive.org/web/20170515022534/https://cpj.org/blog/2016/03/read-and-delete-how-weibos-censors-tackle-dissent-.php>
- Bei Qin, David Strömberg and Yanhui Wu, “Why does China allow freer social media? Protests versus Surveillance and Propaganda,” *Journal of Economic Perspectives*, Vol. 31, No. 1 (Winter 2017), pp. 117-140 <https://www.jstor.org/stable/44133953>.

Feb 19:

First half: Technology, authoritarianism, and surveillance, Germany, China, USA and others part II (Wilkinson)

- Anna Mitchell and Larry Diamond “China’s Surveillance State should Scare Everyone, *The Atlantic* Feb.2 2018 (Yale Library access).
- Louise Lucas and Emily Feng “Inside China’s Surveillance State,” *Financial Times*, July 20 2018 (Yale Library access).
- Adams, A. A., Hosell, S., & Murata, K. (2017). “Following snowden, German uncertainty about monitoring,” *Journal of Information, Communication & Ethics in Society*, 15(3), 232-246. Retrieved from <https://search.proquest.com/docview/1938113258?accountid=15172>

Second half: Surveillance vs. Encryption, part I, FBI vs. Apple (Feigenbaum)

- Required reading
 - ["The Dangerous All Writs Act Precedent in the Apple Encryption Case."](#) by Amy Davidson Sorkin
 - ["Apple is selling you a phone, not Civil Liberties."](#) by Susan Hennessey and Benjamin Wittes
- Optional reading
 - [Government's Motion to Compel](#)
 - [Apple's Motion to Vacate](#)

Feb 21: Surveillance vs. Encryption, part II (Feigenbaum)

- Required reading
 - ["Keys Under Doormats: Mandating insecurity by requiring government access to all data and communications."](#) by Abelson et al.
 - ["Don't Panic: Making Progress on the 'Going Dark' Debate."](#) by Olsen et al. Pages 1-15 are required; the rest is optional.
- Optional reading (technically oriented)
 - ["Lawful Device Access Without Mass Surveillance Risk: A Technical Design Discussion."](#) by Stefan Savage
 - ["Crypto Crumple Zones: Enabling Limited Access Without Mass Surveillance."](#) by Charles V. Wright and Mayank Varia

Feb 26: Social media and Democratization

- US Army Command And Staff College, *Social Media and the Arab Spring: How Facebook, Twitter, and Camera Phones Changed the Egyptian Army's Response to Revolution*, July 2014. Canvas
- Phillip Howard and Muzammil Hussain, *Democracy's Fourth Wave: Digital Media and the Arab Spring* (Oxford University Press, 2013). Yale Library Online Book, Chapters 1, 3.

Feb 28: First in-class exam

March 5: Internet of Things (Feigenbaum)

- Required reading and viewing
 - ["The Internet of Things and the Fourth Amendment of Effects."](#) by Andrew G. Ferguson.
 - ["The Internet Of Things: Dangerous Future."](#) by Bruce Schneier
 - ["Click Here to Kill Everybody."](#) Schneier's talk at Google (youtube video)
- Optional reading (technically oriented)

- [“Internet of things: Vision, applications and research challenges.”](#) by Daniele Miorandi *et al.*

March 7: Internet Platform Monopolies and Antitrust Law (Feigenbaum)

- [“Amazon’s Antitrust Paradox.”](#) by Lina M. Khan
- [“Lawyers and Monopoly Power.”](#) a speech by Matt Stoller at the Harvard Law Forum (youtube video)

March 26: Governance and Corruption (Wilkinson):

- Shankar Aiyar, *Aadhar: A biometric history of India’s 12-digit revolution* (Delhi: Westland, 2017), extracts.
- Sagar, “How Aadhar and digitization compounded problems of corruption and leakage in Jharkhand,” *Caravan*, August 2017
<http://www.caravanmagazine.in/vantage/aadhaar-digitisation-compounded-leakages-exclusion-plaguing-pds-jharkhand>
- Ujwala Uppaluri, “The Aadhar programme violates due process and democratic rights,” *Caravan* 5 August 2017,
<http://www.caravanmagazine.in/vantage/aadhaar-violates-democratic-process-constitutional-rights>.

March 28: Political data-science basics (Guest lecture by Joshua Kalla)

- David Nickerson and Todd Rogers, “Political Campaigns and Big Data,” *Journal of Economic Perspectives* Volume 28, Number 2 (Spring 2014) pp. 51–74. (Yale Library).

April 2: Fairness (or the lack thereof) in Machine Learning (Feigenbaum)

- Required reading
 - [“Big Data’s Disparate Impact.”](#) by Solon Barocas and Andrew D. Selbst.
Only the following sections are required, and the rest is optional:
 - Introduction (pp. 673-677)
 - Examples from Part I (first full paragraph of 682 to 684, first full paragraph of 685 to 687, first full paragraph of 689 to 690)
 - Disparate Impact section (pp. 701-712)
 - Part III (pp. 714-728)
 - [“A computer program used for bail and sentencing decisions was labeled biased against blacks. It’s actually not that clear.”](#) by Avi Feller
 - [“How big data is unfair.”](#) by Moritz Hardt
- Optional reading (technically oriented)

- ["Fairness through Awareness."](#) by Cynthia Dwork *et al.*
- ["Calibration for the \(Computationally Identifiable\) Masses."](#) by Ursula Hebert-Johnson *et al.*

April 4: Big Data, Information, and Asymmetric Wars (Wilkinson)

- Eli Berman, Joseph H Felter and Jacob H Shapiro, *Small Wars: The Information Revolution in Modern Conflict* (Princeton University Press, 2018). Chapter 3 "Information-Centric Insurgency," pp.77-81, Chapter 4 "The Information Mechanism," pp. 82-108, Chs.9-10 "What Works?" and "The Information Mechanism," pp.264-300.

April 9: Trolling, Social Media, Rumors and Conflict (Wilkinson)

- Swati Chakrabarty, *I am a Troll: Inside the Secret World of the BJP's Digital Army* (Delhi: Juggernaut, 2016). Canvas.
- BSR, *Human Rights Impact Assessment: Facebook in Myanmar* (October 2018)
- "Facebook admits it was used to incite violence in Myanmar," https://fbnewsroomus.files.wordpress.com/2018/11/bsr-facebook-myanmar-hria_final.pdf
- Alexandra Stevenson, *New York Times*, Nov. 6, 2018.
- "Burned to death because of a rumor on Whatsapp," BBC news monitoring, 12 Nov 2018, <https://www.bbc.com/news/world-latin-america-46145986>.

April 11: Computer Revolution and International Security (Wilkinson):

- Future of Humanity Institute, *The Malicious Use of Artificial Intelligence: Forecasting, Preventing and Mitigation* February 2018. <https://arxiv.org/ftp/arxiv/papers/1802/1802.07228.pdf>
- Paul Scharre, *Army of None: Autonomous Weapons and the Future of War* (Norton, 2018). Ch.12 "Failing Deadly, the risk of autonomous weapons," and Ch.14 "The Invisible War, autonomy in cyberspace," extracts on Canvas.
- Michael C. Horowitz, "Artificial Intelligence, International Competition and the Balance of Power," *Texas National Security Review* 1,3, (2018). <http://hdl.handle.net/2152/65638>

April 16: Financial Security (Wilkinson); Financial fraud; risk of financial volatility in computer driven markets; bitcoin and crypto currencies

- Aleksandr Berentsen and Fabian Schar, "A Short Introduction to the World of Cryptocurrencies," *Federal Reserve Bank of St. Louis Review*, First Quarter 2018, 100(1), pp. 1-16.

<https://files.stlouisfed.org/files/htdocs/publications/review/2018/01/10/a-short-introduction-to-the-world-of-cryptocurrencies.pdf>

- Teunis Brosens, Why Bitcoin is destined to be a niche asset,” ING Economic Analysis 18 Nov 2017,
https://think.ing.com/uploads/reports/Why_Bitcoin_to_become_niche_asset_151217_OWEN_17.pdf

April 18: Cyber War (Feigenbaum)

- ["The UN Charter"](#)
Only the following sections are mandatory reading (rest is optional):
 - Article 2(4)
 - Article 51
 - Chapter VII
- ["The Law of Cyber Attack."](#) by Oona A. Hathaway *et al.*
- ["Cyber War I: Estonia Attacked from Russia."](#) by Kertu Ruus

April 23: Cyber Espionage (Feigenbaum)

- ["An International Legal Framework for Surveillance."](#) by Ashley Deeks. Part I is required; the rest is optional.
- ["To Kill a Centrifuge."](#) by Ralph Langner

April 25: Second in-class exam