

Syllabus

INFO 303: Search Engines and Society

School of Information, University of British Columbia

Description: The course covers aspects of technical implementation and societal impact of search engines. Explores how Google and other Internet search engines are powerful, global, and non-neutral tools that drive economies and shape our views of the world.

Course Overview: Everyday, Google handles billions of searches. Technically, how do search engines organize the web to make even obscure information findable? How do search results mirror and shape our everyday decisions, our lives and patterns of social behaviour? This course provides an introductory review of the science of search engines, including how search engines discover webpages, analyze their content, and index and rank webpages in response to a user query. Building on this foundation, the course then examines the many profound and fascinating implications of this technology. We will explore the opportunities and the sociotechnical and ethical concerns that arise from the massive and global scale deployment of search technologies by companies such as Google, Microsoft, Baidu, and Yandex. Specific topics, including algorithmic bias, censorship, misinformation, privacy, and gatekeeping are covered.

Learning Outcomes:

Upon completion of this course you will be able to:

LO1 Use search engine technologies effectively to collect and analyze digital information and data for a range of purposes in your own lives;

LO2 Explain how search engines work, including the design of technical components that collect, process, rank and recommend web content; .

LO3 Research and critique search engine technologies with respect to their ethical and social impact;

LO4 Analyze complex issues such as algorithmic bias, censorship, misinformation, privacy, and gatekeeping in relation to the historic, economic, and technical context of search engines.

Course Topics:

- History of search engines
- Technical components of search engines
 - Crawling / text acquisition
 - Indexing / text processing
 - Ranking and Recommendation
- Sociotechnical and ethical issues of search engines
 - Ethical theory and critiques of search engines
 - Search engine economic models and issues, including ad economy; antitrust; and copyright
 - Search engine bias and misinformation
 - Gate keeping; Censorship
 - Privacy and surveillance capitalism
- Living with search engines
 - Search behaviour and use of search engines
 - Search engine regulation
 - Alternative search engines

Format of the course: The course is designed to meet twice per week. Each week the first class will take the form of an interactive lecture to introduce the core concepts and the topic of the week. The second class each week will include a shorter lecture and a workshop in which students will work in small groups to investigate a problem related to the week's theme. These will involve working with online search tools or will take the form of a guided discussion.

Required and Recommended Reading. Weekly assigned readings consist of 2-3 items, which include journal articles, book chapters, news articles, podcasts and videos.

Course Assignments and Evaluation

1. Search Diary and Reflection (week 4) – 15% [LO1, LO2]

Through a week-long digital diary, you will reflect on the role of search engines in your everyday life (LO1). Diary entries will focus on the motivation and context of search engine use. You will record and reflect upon 4 instances of search engine use framed by a series of standard questions and including a contextual photo. The diary will be up to 5 pages in length. The assignment is intended to prime your thinking about topics covered in the course by reflecting on your own experiences with search (LO1), and on how search engines function (LO2).

2. Group Lab Reports (5 in total) - 25%

You will work on set problems in assigned lab groups of 3-4 students and submit a structured lab-style report of 1-2 pages in length. The lab work is designed for students to strengthen their own skills in using search-based tools (LO1) and their understanding of how search engines work (LO2); to develop critical skills based on direct interaction with search technologies (LO3); and to delve deeper into weekly topics (LO4). Each lab will be carried out during class time as part of the workshop time allocated each week.

3. Midterm Test (in class) - 25%

An in-class test will take place in Week 6 to assess students' understanding of the general structure and key technical components of search engines (LO2). The test will include multiple choice, definitional and short answer questions drawn from class material and readings from weeks 1-5. An in-class review session will be held prior to the mid-term.

4. Term Paper (week 12) – 25%

Students will work independently to write a paper of approximately 2500 words that addresses a topic relevant to the themes covered in the second half of the course (e.g., algorithmic bias, censorship, economic models, privacy, and gatekeeping). The paper is intended as an opportunity for students to analyze and critique the social and ethical impacts of search engines (LO3) in the content of one or more related issue (LO4). Papers should draw upon a combination of peer reviewed research papers and contemporary media reports to identify the technical, ethical and social dimensions of their topic and to map out alternate approaches or solutions to the issue. A list of suggested topics will be provided, but students will have the opportunity to propose their own topics of interest.

A 250 word ungraded proposal will be due in Week 8. The proposal should outline the chosen topic, research question or thesis and identify at least 3 sources for the paper.

5. Participation -10%

Students' participation will be assessed based on the quality of their contributions to the class discussions, attendance, and submission of homework, as assigned. Students are expected to be prepared to discuss readings, share their ideas with other students and ask questions in a manner that demonstrates mutual respect and willingness to listen to and learn from a range of perspectives. Course readings will be essential to gain an understanding of how search engines work (LO2); develop a critical perspective on the role of these technologies in society (LO3); and to develop knowledge of the complex social, ethical and legal issues covered in the course (LO4).

Course Schedule

Week 1: Course Introduction and History of Search Engines

Required Materials

Google (2020) Trillions of Questions, no Easy Answers: A (home) movie about how Google search works. https://www.youtube.com/watch?v=tFq6Q_muwG0

Croft, B., Metzler, D., & Strohman, T. (2015). Chapter 1 in *Search engines: Information retrieval in practice*. Boston, MA: Addison-Wesley.

Granka, L. A. (2010). The Politics of Search: A Decade Retrospective. *The Information Society*, 26(5), 364–374.

Week 2: How does search work, Part 1: Content Types and Crawling

Required Materials

Croft, B., Metzler, D., & Strohman, T. (2015). *Chapter 2 in Search engines: Information retrieval in practice* (Boston, MA: Addison-Wesley.

Code.org (2017) The Internet: How Search

Works https://www.youtube.com/watch?v=LVV_93mBfSULLinks to an external site.

In class exercise: Robots Exclusion Protocol

Week 3: How does search work, Part 2: Text Processing and Indexing

Required Materials

Smucker, M. D. (2013). Information representation in I. Ruthven & D. Kelly (Eds.), *Interactive Information Seeking, Behaviour and Retrieval*. Facet.

Media: Computerphile. (August, 2015). Max Wilson on How Search Engines Treat Data [10 minute Video] <https://www.youtube.com/watch?v=vrjAlBgxm> wLinks to an external site.

Graded Lab on Document Analysis and Representation

Week 4: How does search work, Part 3: Ranking & Recommendation

Required Materials

Teevan, J. and Dumais, S. (2013). Web retrieval, ranking and personalization. In I. Ruthven & D. Kelly (Eds.), *Interactive Information Seeking, Behaviour and Retrieval* (1st ed., pp. 189-204). Facet.

Segal, D. (February, 2011). The Dirty Little Secrets of Search. *The New York Times*.

<https://www.nytimes.com/2011/02/13/business/13search.html>

(video) How Search Engines Work - Professor Terry Winograd explains the Google Page Rank Algorithm (6 minutes) <https://www.youtube.com/watch?v=QLDHih81zX0>Links to an external site.

(video) Ahrefs (2019) What is SEO and how does it work? https://www.youtube.com/watch?v=R-XxAk8-OXY&ab_channel=AhrefsLinks to an external site.

Week 5: How do people search? Search skills and behaviours

Required Materials

Haider, J. and Sundin, O. (2019) *Invisible Search and Online Search Engines: the Ubiquity of Search in Everyday Life*. (Chap. 4, Search in Everyday Life, p 76-99). Routledge.

Graded Lab – Large Scale query analysis with Google Trends

Week 6: Review and Midterm Exam

Required Materials

Podcast (with transcript) HCI, IR and the search for better search with Dr. Susan Dumais - Microsoft Research, <https://www.microsoft.com/en-us/research/podcast/hci-ir-and-the-search-for-better-search-with-dr-susan-dumais>

Midterm Examination

Week 7: Economics and Ethics of Search Engines

Required Materials

Diaz, A. (2008). Through the Google goggles: sociopolitical bias in search engine design. In A. Spink & M. Zimmer (Eds.), *Web Search: Multidisciplinary Perspectives* (pp. 11–34). Springer.

Tavani, Herman, "Search Engines and Ethics", Section 3.1 of Search Engine Bias and the Problem of Opacity/Nontransparency. *The Stanford Encyclopedia of Philosophy* (Fall 2020 Edition), Edward N. Zalta (ed.)

Graded Lab 3: Managing Exposure to Interest Based Advertising

Week 8: Search Engine Bias

Required Materials

Noble, S. (2018) *Algorithms of Oppression: How Search Engines Reinforce Racism*. (Chap. 1, 15-63.) NYU Press.

Manjoo, Farhad (2018): Here's the Conversation We Really Need to Have About Bias at Google. *The New York Times* <https://www.nytimes.com/2018/08/30/technology/bias-google-trump.html> [Links to an external site.](#)

Cathy O'Neil. (September, 2017). The Era of Blind Faith in Big Data Must End [13 minute video]. YouTube. https://www.youtube.com/watch?v=2u_eHHzRt0 [Links to an external site.](#)

In class exercise: Informal audit of bias in image search

Week 9: Gatekeeping and Knowledge Mediation

Required Materials

Bozdogan, E. (2013). Bias in algorithmic filtering and personalization. *Ethics and Information Technology*, 15(3), 209–227.

(Video) (2019) Google and YouTube moderators speak out. The Verge. https://www.youtube.com/watch?v=OqP-gde4M-Q&ab_channel=TheVerge

Graded Lab 4: Government Censorship: Content Removal Requests

Week 10: Surveillance and Privacy

Required Materials

Halavais, A. (2018) *Search Engine Society*, Chap. 7. Privacy, p. 198-226.

Carr, N. (January, 2019). Thieves of experience: How Google and Facebook Corrupted Capitalism. *Los Angeles Review of Books* <https://lareviewofbooks.org/article/thieves-of-experience-how-google-and-facebook-corrupted-capitalism>

Satariano, A. (2019) Google is fined \$57 Million under Europe's data privacy law. New York Times. January 21, 2019 <https://www.nytimes.com/2019/01/21/technology/google-europe-gdpr-fine.html>

Group Discussion: The Right to be Forgotten

Week 11: Emerging Technologies and Search

Required Materials

Huang, K. (2022, September 16). For Gen Z, TikTok Is the New Search Engine. *The New York Times*. <https://www.nytimes.com/2022/09/16/technology/gen-z-tiktok-search-engine.html>Links to an external site.

Grant, N. and Metz, C. (2022, December 21) A new chat bot is a "code red" for Google's search business. New York Times. <https://www.nytimes.com/2022/12/21/technology/ai-chatgpt-google-search.html>Links to an external site.

Weil, E. (March 1, 2023). You are not a parrot and a chatbot is not a human. And a linguist named Emily M. Bender is very worried what will happen when we forget this. Artificial Intelligence. <https://nymag.com/intelligencer/article/ai-artificial-intelligence-chatbots-emily-m-bender.html>

Graded Lab 5: Large Language Models and Chat-Based Search Systems

Week 12: Search Engine Regulation and Governance

Required Materials

Morrison, S & Ghaffary, S. (2022) The Case Against Big Tech: Google. *Vox* <https://www.vox.com/recode/22822916/big-tech-antitrust-monopoly-regulation>

Ziewitz, M. (2016). Governing Algorithms: Myth, Mess, and Methods. *Science, Technology, & Human Values*, 41(1), 3–16. <https://go.exlibris.link/Ydb6L2n5> Links to an external site.]

Duhigg, C. (February, 2018). The Case Against Google. *The New York Times Magazine*. <https://www.nytimes.com/2018/02/20/magazine/the-case-against-google.htm>

Week 13: Alternatives to Google

Required Materials

Brunton, F. and Nissenbaum, H. (n.d.) The Fantasy of Opting Out. *The MIT Press Reader*. <https://thereader.mitpress.mit.edu/the-fantasy-of-opting-out/>Links to an external site.]

Schofield, J. (December, 2019). Can DuckDuckGo Replace Google Search While Offering Better Privacy? *The Guardian*. <https://www.theguardian.com/technology/askjack/2019/dec/12/duckduckgo-google-search-engine-privacy>Links to an external site.]

Additional Readings List

Information Retrieval - General

Book Series & Books

Morgan Claypool Synthesis Lecture series on Information Retrieval

<https://www.morganclaypool.com/toc/icr/1/1>

Springer Information Retrieval Book Series: <https://www.springer.com/series/6128>

NOW Publishing Foundations and Trends in Information Retrieval book series - <https://www-nowpublishers-com.eu1.proxy.openathens.net/INR>

Croft, B., Metzler, D., & Strohman, T. (2010). *Search engines: Information retrieval in practice*. Boston, MA: Addison-Wesley. <https://ciir.cs.umass.edu/downloads/SEIRIP.pdf>

Halavais, A. (2018) *Search Engine Society*, 2nd ed. Digital Media and Society Series. Polity Press.

Kelly, D. and Ruthven, I. (eds) (2013) *Interactive Information Seeking, behavior and Retrieval*, Facet publishing.

Levene, M. (2010) *An Introduction to Search Engines and Web Navigation* 2nd ed.

Noble, S. (2018) *Algorithms of Oppression: How Search Engines Reinforce Racism*. NYU Press.

Smyrniotis, N. (2018). *Internet Oligopoly: The Corporate Takeover of Our Digital World* (Digital Activism and Society: Politics, Economy and Culture in Network Communication). Emerald Publishing.

Rosenberg, Daniel (2021) *Search in Information: A Historical Companion*, Blair et al. eds. Princeton University Press.

Russell, Daniel (2019) *The Joy of Search: A Google Insider's Guide to Going Beyond the Basics*. MIT Press.

Journal and Media Articles

General

Borlund, P. (2003a). The concept of relevance in IR. *Journal of the Association for Information Science and Technology*, 54 (10), 913-925.

Bush, V. (July, 1945). As We May Think. *The Atlantic*.

<https://www.theatlantic.com/magazine/archive/1945/07/as-we-may-think/303881/>

Levy, S. (February, 2010). How Google's Algorithm Rules the Web. *Wired*.

https://www.wired.com/2010/02/ff_google_algorithm/

Specter, M. (May, 2000). The Race to Build a Better Search Engine: How Google took on its competition. *The New Yorker*. <https://www.newyorker.com/magazine/2000/05/29/search-and-deploy>

Search Engine Optimization

Carroll, N. (2011) Search Engine Optimization, Chapter 13 in Marcia Bates, ed. *Understanding information retrieval systems: management, types, and standards*. New York: Auerbach.

Schultheiß, S. and Lewandowski, D. (2021), "Outside the industry, nobody knows what we do" SEO as seen by search engine optimizers and content providers, *Journal of Documentation*, 77(2), 542-557. <https://doi.org/10.1108/JD-07-2020-0127>

Bias and Manipulation

- Baker, P. and Potts, A., 2013. 'Why do white people have thin lips?' Google and the perpetuation of stereotypes via auto-complete search forms. *Critical Discourse Studies*, 10(2), pp.187-204.
- Bozdog, E. (2013). Bias in algorithmic filtering and personalization. *Ethics and Information Technology*, 15(3), 209–227. <https://doi.org/10.1007/s10676-013-9321-6>
- Diaz, A. (2008). Through the Google Goggles: Sociopolitical Bias in Search Engine Design. In A. Spink & M. Zimmer (Eds.), *Web Search: Multidisciplinary Perspectives* (pp. 11–34). Springer. https://doi.org/10.1007/978-3-540-75829-7_2
- Gao, R., & Shah, C. (2021). Addressing bias and fairness in search systems. Proceedings of the 44th International ACM SIGIR Conference on Research and Development in Information Retrieval. <https://doi.org/10.1145/3404835.3462807>
- Gao, R., Ge, Y., & Shah, C. (2022). FAIR: Fairness-aware information retrieval evaluation. *Journal of the Association for Information Science and Technology*. <https://doi.org/10.1002/asi.24648>
- Goldman, E. (2008). Search Engine Bias and the Demise of Search Engine Utopianism. In A. Spink & M. Zimmer (Eds.), *Web Search: Multidisciplinary Perspectives* (pp. 121–133). Springer. https://doi.org/10.1007/978-3-540-75829-7_8
- Homer, M. (2020). Sovereignty and algorithms: Indigenous land disputes in digital democracy. *Platforms, protests, and the challenge of networked democracy* (pp. 329-343). Springer International Publishing. https://doi.org/10.1007/978-3-030-36525-7_18
- Kravets, Daria & F. Toepfl (2021) Gauging reference and source bias over time: how Russia's partially state-controlled search engine Yandex mediated an anti-regime protest event, *Information, Communication & Society*, DOI: 10.1080/1369118X.2021.1933563
- Otterbacher, J. (2018). Addressing social bias in information retrieval. *Lecture Notes in Computer Science*, 121–127. https://doi.org/10.1007/978-3-319-98932-7_11
- Rieder, B., & Sire, G. (2014). Conflicts of interest and incentives to bias: A microeconomic critique of Google's tangled position on the Web. *New Media & Society*, 16(2), 195–211. <https://doi.org/10.1177/1461444813481195>
- The New York Times*: Here's the Conversation We Really Need to Have About Bias at Google <https://www.nytimes.com/2018/08/30/technology/bias-google-trump.html>

Surveillance, Privacy & Censorship

- Brunton, F. and Nissenbaum, H. (n.d.) *The Fantasy of Opting Out*. The MIT Press Reader. <https://thereader.mitpress.mit.edu/the-fantasy-of-opting-out/>
- Carr, N. (January, 2019). Thieves of experience: How Google and Facebook Corrupted Capitalism. Los Angeles Review of Books. <https://lareviewofbooks.org/article/thieves-of-experience-how-google-and-facebook-corrupted-capitalism>
- Downey, T. (March, 2010). China's Cyberposse. *The New York Times Magazine*. <https://www.nytimes.com/2010/03/07/magazine/07Human-t.html>
- Faillo, M., Hughes, J., & O'Rourke, J. (2017). Google Street View : overstepping the boundaries of privacy and security.

- Jiang, M. (2013). The business and politics of Search Engines: A comparative study of Baidu and Google's search results of internet events in China. SSRN Electronic Journal. <https://doi.org/10.2139/ssrn.2027436>
- Jiang, M. (2014). Search concentration, bias, and parochialism: A comparative study of Google, Baidu, and Jike's search results from China. *Journal of Communication*, 64(6), 1088–1110. <https://doi.org/10.1111/jcom.12126>
- Mayer-Schönberger, Viktor. *Delete: The Virtue of Forgetting in the Digital Age*. Princeton: Princeton University Press, 2011.
- Meserve, S. A., & Pemstein, D. (2017). Google politics: The political determinants of internet censorship in democracies. *Political Science Research and Methods*, 6(2), 245–263. <https://doi.org/10.1017/psrm.2017.1>
- Nanna Bonde Thylstrup & Stina Teilmann (2017) Thumbnail images: uncertainties, infrastructures and search engines, *Digital Creativity*, 28:4, 279-296, DOI: 10.1080/14626268.2017.1375961
- O'Rourke, J. S., Harris, B., & Ogilvy, A. (2007). Google in China: Government censorship and corporate reputation. *Journal of Business Strategy*, 28(3), 12–22. <https://doi.org/10.1108/02756660710746229>
- Satariano, A. (2019) Google is fined \$57 Million under Europe's data privacy law. New York Times. January 21, 2019. <https://www.nytimes.com/2019/01/21/technology/google-europe-gdpr-fine.html>
- Schofield, J. (December, 2019). Can DuckDuckGo Replace Google Search While Offering Better Privacy? The Guardian. <https://www.theguardian.com/technology/askjack/2019/dec/12/duckduckgo-google-search-engine-privacy>
- Stjernfelt, F., & Lauritzen, A. M. (2020). Facebook and Google as Offices of Censorship. In F. Stjernfelt & A. M. Lauritzen (Eds.), *Your Post has been Removed: Tech Giants and Freedom of Speech* (pp. 139–172). Springer International Publishing. https://doi.org/10.1007/978-3-030-25968-6_12
- Valtysson, B., Jørgensen, R. F., & Munkholm, J. L. (2021). Co-constitutive complexity Unpacking Google's privacy policy and terms of service post-GDPR. *Nordicom Review*, 42(1), 124–140. <https://doi.org/10.2478/nor-2021-0033>
- Zimmer, M. (2008). The externalities of search 2.0: The emerging privacy threats when the drive for the perfect search engine meets Web 2.0. *First Monday*, 13(3). <https://doi.org/10.5210/fm.v13i3.2136>
- Zimmer, M. (2008). The Gaze of the Perfect Search Engine: Google as an Infrastructure of Dataveillance. In A. Spink & M. Zimmer (Eds.), *Web Search: Multidisciplinary Perspectives* (pp. 77–99). Springer. https://doi.org/10.1007/978-3-540-75829-7_6

Regulation and Legal Cases

- Curfman, G. (2020). United States v Google—Implications of the Antitrust Lawsuit for Health Information. *JAMA Health Forum*, 1(12), e201447. <https://doi.org/10.1001/jamahealthforum.2020.1447>

- Duhigg, C. (February, 2018). The Case Against Google. *The New York Times Magazine*.
<https://www.nytimes.com/2018/02/20/magazine/the-case-against-google.html>
- Lamoreaux, N. R. (2019). The Problem of Bigness: From Standard Oil to Google. *The Journal of Economic Perspectives*, 33(3), 94–117.
- Saurwein, F., Just, N., & Latzer, M. (2015). Governance of algorithms: Options and limitations. *Info*, 17(6), 35–49. <https://doi.org/10.1108/info-05-2015-0025>
- Somers, J. (April, 2017). Torching the Modern-Day Library of Alexandria. *The Atlantic*.
<https://www.theatlantic.com/technology/archive/2017/04/the-tragedy-of-google-books/523320/>
- Stone, B. and Silver, V. (August, 2015). Google's \$6 Billion Miscalculation on the EU. *Bloomberg Businessweek*. <https://www.bloomberg.com/news/features/2015-08-06/google-s-6-billion-miscalculation-on-the-eu>
- The Guardian*: https://www.theguardian.com/technology/2018/apr/13/google-loses-right-to-be-forgotten-case?CMP=share_btn_link
- The World's Most Valuable Resource: Regulating the Data Economy. (2017, May 06). *The Economist*, 423, 9. Retrieved from <https://www.economist.com/leaders/2017/05/06/the-worlds-most-valuable-resource-is-no-longer-oil-but-data>
- Ziewitz, M. (2016). Governing Algorithms: Myth, Mess, and Methods. *Science, Technology, & Human Values*, 41(1), 3–16. <https://doi.org/10.1177/0162243915608948>

Ethics and Values

- Friedman, B., & Nissenbaum, H. (1996). Bias in computer systems. *ACM Transactions on Information Systems*, 14(3), 330–347. <https://doi.org/10.1145/230538.230561>
- Friedman, B., Kahn, P. H., & Borning, A. (2009). Value Sensitive Design and Information Systems. In *The Handbook of Information and Computer Ethics* (pp. 69–101). John Wiley & Sons, Ltd.
<https://doi.org/10.1002/9780470281819.ch4>
- Fuchs, C. (2019). A Contribution to the Critique of the Political Economy of Google. *Fast Capitalism*, 8(1), Article 1. <https://doi.org/10.32855/fcapital.201101.006>
- Hinman, L. M. (2005). Esse est indicato in Google: Ethical and Political Issues in Search Engines. 3, 7.
- Hinman, L. M. (2008). Searching Ethics: The Role of Search Engines in the Construction and Distribution of Knowledge. In A. Spink & M. Zimmer (Eds.), *Web Search: Multidisciplinary Perspectives* (pp. 67–76). Springer. https://doi.org/10.1007/978-3-540-75829-7_5
- Knobel, C., & Bowker, G. C. (2011). Values in design. *Communications of the ACM*, 54(7), 26–28.
<https://doi.org/10.1145/1965724.1965735>
- Laidlaw, E. B. (2008). Private Power, public interest: An examination of search engine accountability. *International Journal of Law and Information Technology*, 17(1), 113–145. <https://doi.org/10.1093/ijlit/ean018>
- Mittelstadt, B. D., Allo, P., Taddeo, M., Wachter, S., & Floridi, L. (2016). The ethics of algorithms: Mapping the debate. *Big Data & Society*, 3(2), <https://doi.org/10.1177/2053951716679679>
- Pasquale, F. A. (2008). Internet Nondiscrimination Principles: Commercial Ethics for Carriers and Search Engines. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.1134159>

Tavani, Herman, "Search Engines and Ethics", *The Stanford Encyclopedia of Philosophy* (Fall 2020 Edition), Edward N. Zalta (ed.), <https://plato.stanford.edu/archives/fall2020/entries/ethics-search/>.

Zwass, V. (2011) Ethical Issues in Information Systems, Chapter 6 in Marcia Bates, ed. *Understanding Information Retrieval Systems: Management, Types, and Standards*. New York: Auerbach Publications.

Public Knowledge and Gatekeeping

Daucé, F., & Loveluck, B. (2021). Codes of conduct for algorithmic news recommendation: The Yandex.News controversy in Russia. *First Monday*, 26(5). <https://doi.org/10.5210/fm.v26i5.11708>

Elgesem, D. (2008). Search engines and the public use of reason. *Ethics and Information Technology*, 10(4), 233–242. <https://doi.org/10.1007/s10676-008-9177-3>

Granka, L. A. (2010). The Politics of Search: A Decade Retrospective. *The Information Society*, 26(5), 364–374. <https://doi.org/10.1080/01972243.2010.511560>

Haider, J. and Sundin, O. (2019) *Invisible Search and Online Search Engines: the Ubiquity of Search in Everyday Life*. (Chap. 4, Search in Everyday Life, p 76-99). Routledge.

Huvila, I. (2016) Affective Capitalism of knowing and the society of search engine. *Aslib Journal of Information Management*, 68(5), 566-588

Introna, L., & Nissenbaum, H. (2000). Defining the Web: The politics of search engines. *Computer*, 33(1), 54–62.

Introna, L., & Nissenbaum, H. (2000). Shaping the Web: Why the Politics of Search Engines Matters. *Information Society*, 16(3), 169–185. <https://doi.org/10.1080/01972240050133634>

Labbe, C. (Producer). (2020, February 11). Good Code [Audio podcast – 30 minutes]. <https://www.dli.tech.cornell.edu/goodcode/episode/1ea86721/jake-goldenfein-on-google-scholar>

LaFrance, A. (December, 2016). Searching for Lost Knowledge in the Age of Intelligent Machines. *The Atlantic*. <https://www.theatlantic.com/technology/archive/2016/12/the-search-for-lost-knowledge/506879/>

Newton, C. (December, 2019). The Terror Queue. *The Verge*. <https://www.theverge.com/2019/12/16/21021005/google-youtube-moderators-ptsd-accenture-violent-disturbing-content-interviews-video>

Waddell, Kaveh (January 16, 2016) Why Google Quit China. *The Atlantic*. <https://www.theatlantic.com/technology/archive/2016/01/why-google-quit-china-and-why-its-heading-back/424482/>

Weinberger, D. (May, 2016). Rethinking Knowledge in the Internet Age. *Los Angeles Review of Books*. <https://lareviewofbooks.org/article/rethinking-knowledge-internet-age/>

Search Engine Economics

Jathan, S. (2019). When data is capital: Datafication, accumulation, and extraction. *Big Data & Society*; London, 6(1).

Mager, A. (2012). Algorithmic Ideology: How capitalist society shapes search engines. *Information, Communication & Society*, 15(5), 769–787. <https://doi.org/10.1080/1369118X.2012.676056>

- Petersen, C. (December, 2010). Google and Money! The New York Review of Books.
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