Privacy in the Digital Age – Fall 2024 – A1

Syllabus and Schedule of Classes

INSTRUCTOR

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Open office hours: Monday 5.00PM-6.00PM EST, HBH 2105C

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TAs

Eduardo Abraham Schnadower Mustri

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Open Office Hours: ...

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password for zoom:

LECTURES

Monday and Wednesday

A1: 9.30AM-10.50AM EST, HBH1204

TEXTBOOKS

We will not use a textbook in this class, but we will have plenty of academic readings (articles) – with publication dates spanning from 1890 to 2024. All readings have been made available on Canvas.

COURSE DESCRIPTION

Privacy is a complex and multi-faceted concept. **This course combines technical, economic, legal, psychological, ethical, and policy perspectives to present a holistic view of its role and function in the digital age.**

The reduction of the cost of storing and manipulating information has led organizations to capture increasing amounts of information about individual behavior. New trade-offs have emerged for parties involved with privacy-enhancing or intrusive technologies: individuals want to avoid the misuse of the information they pass along to others, but they also want to share enough information to achieve satisfactory interactions; organizations want to know more about the parties with whom they interact, but they do not want to alienate them with policies deemed as intrusive. Is there a "sweet" spot that satisfies the interests of all parties? Is there a combination of technological solutions, economic incentives, and legal safeguards that is acceptable for the individual and beneficial to society?

This course examines the above issues by building upon **published research at the overlaps of computer science, social sciences, and public policy**. The course begins by comparing early definitions of privacy to the current information-focused debate. It then considers:

- technological aspects of privacy (privacy concerns raised by new IT such as the Internet, wireless communications, and computer matching; tracking techniques and data mining; privacy enhancing technologies and anonymous protocols, …),
- economic aspects (economic models of the market for privacy, financial risks caused by privacy violations, the value of customer information, …),
- legal aspects (laissez-faire versus regulated approaches, US versus EU legal safeguards, …),
- policy aspects (trade-offs between individual privacy rights and societal needs, …),
- managerial aspects (the emerging role of Chief Privacy Officers, compulsory directives and self-regulative efforts, …)

Let me repeat a key word from the above description: "holistic." This term refers to the fact that we will try to cover **a variety of angles** in the privacy debate, and we will try to connect and contrast each angle to the others. The approach of this class therefore somewhat privileges breadth over depth (while offering tools and directions for more focused analysis) to give you a broad and varied understanding of privacy problems in a networked digital society.

OBJECTIVES

The main objective of this course is to provide **an informed and critical view of the role and value of privacy in the digital age**. Because privacy is a complex and multi-faceted concept, the course aims to present and combine technical, economic, legal, and policy perspectives.

The goal of this class is not to tell you whether privacy is important or unimportant. Also, the goal of this class is not to scare you into believing that every instance of information disclosure is a privacy invasion – or to convince you that every instance of information collection is legitimate. Instead, the goal of this class is to **educate you about the kinds of information that may be gathered about individuals, and to help you determine the individual and societal trade-offs associated with accepting or avoiding its collection and/or use**. Since privacy is a very subjective and contextual concept, what may be a privacy invasion for you in one setting may not be in another. The challenge we present to you in this course is to understand the difference.

While many of the topics covered in the course will include information of practical relevance to privacy professionals (that is, those of you specifically interested in managing privacy issues in the workplace), **this course does not primarily focus on privacy *management.* The primary learning objective of this course is broader:** as noted above, it is about providing students with a holistic view of the role and function of privacy in the digital age, and a critical understanding of its many different dimensions (economic, technological, policy, and so forth), so that the students may be equipped to apply that knowledge across different environments, including policy-making, industry, and research. **Students specifically interested in privacy management may be able to focus on that type of material by enrolling in some of the other privacy courses offered at Heinz and in programs such as the Master in Privacy Engineering.**

LOGISTICS

Classes and Review sessions will be in person on CMU campus. We will follow CMU safety regulations concerning COVID 19. We will use Canvas (or some of Canvas add-ons, such as Gradescope) for online discussions, for HWs submission, for short assessments, and for grading. Note: short assessments will take place during lectures – so please be ready to use a laptop or a mobile device (smart phone or tablet) to access Canvas during class.

Active participation in the class is welcome, including interacting and engaging in the discussion of the readings and topics listed in this syllabus. The readings listed in the schedule of classes should be completed prior to the class for which they are listed.

GRADING

The course consists of a combination of readings, assignments, and class discussions. Assignments include homework assignments and a final project.

Specifically, your grade will depend on the following components:

1. **Homework assignments** **40%**
2. **Short assessments** **10%**
3. **Final project** **50%**

1. There will be three homework assignments. Homework assignments will be distributed via Canvas and should be submitted via Gradescope (linked from Canvas) by the deadline indicated on Canvas. Homework assignments consist of short reports (with a predetermined maximum number of pages) and/or analyses of topics related to different parts of the course:

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    - Key privacy concepts;
    - Privacy technologies;
    - Privacy economics and policy.

Homework assignments will be graded based on **quality of research, rigor of analysis, completeness, and clarity**; please carefully **check the Grading Rubric at the end of each homework assignment to understand how to effectively complete each homework, and how we will grade your efforts.** Quality of your research and your analysis is more important than quantity (i.e. length of your submission).

Please carefully check the homework schedule in the latter part of this document, to avoid scheduling meetings that conflict with your ability to submit the homework in time. Postponing or delaying submission of homework, in general, will not be allowed (and in the very exceptional circumstances in which it may be, the homework grading would be subject to penalty).

2. Short assessments will be administered via Canvas during each lecture, typically close to the end of a Lecture (excluding Lecture 1, of course). They will be very short, and mainly aimed at making sure that you have been able to follow the material covered during the Lecture. Your worst-performing Short assessment across all lectures will be eliminated (that is, it will not count towards your grade).

3. The Final Project is a research project in which you propose and then address an interesting (and hopefully novel) question related to or inspired by one of the topics covered in class. The final project **must be a group effort (from a minimum of 2 to a maximum of 4 students in each team). Projects will be graded based on quality of research, rigor of analysis, completeness, clarity, conciseness/organization, and (where applicable) calculations and/or evaluation.**

Please use the **Objectives Rubric for your Final Project** attached at the end of this syllabus as a guideline to these criteria. You can see the final project as a sort of small-scale research effort. To complete a good final project, you must come up with an interesting research question, methodology, and produce some quantitative and/or qualitative results based on that methodology. The research question should at least strive to be novel and interesting. It is suggested that you focus on a narrowly defined topic rather than a broad field of inquiry (e.g., "Re-identification of pseudonymous Twitter profiles using clickstream data" is much better than "Privacy in social networks"). The methodology should be sound and appropriate to investigating that question. Thus, you can choose the methodology that best fits your project: your project could be "analysis-oriented", or "coding-oriented", or "policy-oriented", depending on your skills and on your interests. For instance, your project could consist in any one of the following approaches (please note that these are just examples, and that you do *not* need to use all these approaches):

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    - ... an empirical study based on primary or secondary data (for instance, data that you mined/scraped/otherwise collected from the Internet), or
    - ... an experiment (for instance, a behavioral experiment), or
    - ... an analysis/critique of an existing privacy technology/framework/scenario, or
    - ... an analysis of the privacy implications/trade-offs an existing tool/app, or
    - ... an analysis of a new privacy attack vector, or
    - ... a novel privacy protecting (or invasive) app or tool of your design, or
    - ... and so forth (you may find ideas for possible project topics by "glancing ahead" at the course's Required or Recommended Readings throughout the various weeks; or by checking websites such as EPIC http://www.epic.org/

Links to an external site. or IAPP http://www.privacyassociation.org/

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    - Links to an external site.; or by sending me an email and discussing your privacy interests with me)

On the other hand, as a rule try and avoid projects of these types:

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    - Surveys of attitudes (i.e., projects that simply consist in asking people their opinions about some privacy sensitive issues).
    - Literature reviews (i.e., mere reviews of what other people have studied/found out regarding certain privacy issues).

Your final project document should include the discussion and motivation for the research question you chose to investigate, a review of the relevant literature, a description of your methodology and/or hypotheses, and the analysis of your results. While there is no mandatory page length or page limit for

the project, remember that *quality* of research and analysis is more important than *quantity*. Thus, you are encouraged *not* to go beyond 20 pages long, excluding Appendices, if you have any. (There is no minimum mandatory length either; that noted, considering that it is natural for students to wonder about expectations regarding the final project, here are some rules of thumbs: on average, a good final project document would be detailed enough to cover 15 to 20 pages single spaced, 12 font size, including tables and references; you can also look at some examples on Canvas of past projects completed for this course.) If you have never prepared a research project/essay in any of your other undergraduate or graduate courses, feel free to check out the ***very* rough *draft* document titled "How to do research"** that I have uploaded to Canvas to offer some guidance. This draft document includes a list of tips/hints/suggestions aimed at students who want to do research. For instance, the document offers information (as well as links to other resources) on how to find and select an attractive research topic, find information, and look for references on that topic, avoid plagiarism, create a bibliography, organize your paper, and write a research document.

I am here to help you with your final project, and so are the TAs. Around mid-way through the course, you will be nudged to select one specific idea and provide a proposal for your final project. The proposal can be an informal email sent to me and the TAs with information such as your proposed topic, the research question you plan to investigate, your suggested methodology, your hypothesis and expected results, etc. You will *not* be graded on your proposal - this informal email is meant to help you get feedback from me and the Teaching Assistants (TAs). In addition, you and your team will be expected to present your results to the rest of the class during the last class of the course. Also, the performance of your presentation will *not* be graded. Instead, it is an opportunity for you to showcase your research and receive feedback.

IRB approval for projects

If your research/project/case study involves experiments or surveys or other activity involving human subjects, or personal information about human subjects**, you will need to understand concepts such as informed consent, human subjects' protections, and IRB** (Institutional Review Board) regulations before running your study **– even though you will *not* be required to obtain actual IRB approval for your study** (unless you plan to use the results of your study in future publications). Please visit and carefully check the CMU IRB site: https://www.cmu.edu/research-compliance/human-subjects-research/ to find information about dealing with and respecting human subjects in research, and please feel free to send me an email to come to office hours to discuss IRB issues.

ABOUT READINGS AND CLASS DISCUSSIONS

Classes will be a **combination of lectures and discussions:**

- Lectures: I will cover and extend the material and the topics covered in the readings.
- Discussions: we will also discuss together those topics – hence it is important that you know the readings before class.

Some classes have multiple readings; others, just one or two readings. Note that over the course of this Mini we will **not necessarily discuss *each and every* reading in class, neither will we cover in stringent detail each single reading.** Imagine readings and lectures as partially overlapping Venn sets: the classes touch upon the readings (but also touch upon materials *not* covered in the readings); and the readings offer you a means to learn more, and extend your understanding of, the same topics that we will cover in the slides.

INTEGRITY

Posting HW questions online to solicit solutions, plagiarizing from online sources (e.g., using answers found online), copying from another student's homework, as well other forms of cheating, are considered university offenses. Just *don't* do it. Please. It's not worth it. These rules, as well as the academic integrity standards outlined in your student handbook, will be strictly enforced. You are responsible for being familiar with the university standard for academic honesty and plagiarism. Please see the CMU Student Handbook for information. In order to deter and detect plagiarism, online tools and other resources are used in this class.

Violations of these rules or standards are considered a fundamental breach of trust and may result in loss of grades and/or failure of the entire course. **And remember: an academic record showing evidence of cheating or of having failed a course will harm your career much more than getting a slightly lower grade in a HW or Quiz - thus, *don't do it.***

Regarding **Generative AI, Large Language Models (LLM), ChatGPT**, and so forth:

- You may use Generative AI and Large Language Model (LLM) tools to further explore topics related to this course and for research – essentially leveraging these tools as powerful search engines
- During some class sessions, we may leverage together these tools to support your learning, provide you with an opportunity to explore how they can be used, and/or better understand their benefits and limitations
- In at least one of the questions in our three HWs, we will specifically ask you to compare Generative AI's answers to those produced by your independent research
- However, other than the use cases described above, you may not use these tools to generate work for an assignment to be submitted for a grade, as this cannot be considered a substitute for developing the fundamental skills and expertise represented by the learning objectives of this course. Please note that generative AI tools rely on predictive models to generate content that may appear correct, but has been shown to at times be incomplete, inaccurate, taken without attribution from other sources, and/or biased. Consequently, an AI tool should not be considered a substitute for traditional approaches to research. You are ultimately responsible for the content of the information you submit and may not attempt to pass off any work generated by an AI program as your own.

TAKING CARE OF YOURSELF AND VARIOUS FORMS OF SUPPORT

Do take care of yourself. Do your best to maintain a healthy lifestyle - eating well, exercising, getting enough sleep, and taking some time to relax. This will help you achieve your goals and cope with stress. Courses at CMU can be intense. If you are stressed out, please know that you are not alone, and that there are many helpful resources available on campus - an important part of the college experience is learning how to ask for help if it is needed. Asking for support sooner rather than later is often helpful. If you, or anyone you know, experiences academic stress, difficult life events, or feelings like anxiety or depression, please seek support: consider reaching out to a friend, faculty or family member you trust. Also, Counseling and Psychological Services (CaPS) is there to help: you can call 412-268-2922 or visit their website at http://www.cmu.edu/counseling/.

Furthermore, CMU has a **Student Academic Success Center (SASC)** that focuses on creating spaces for students to engage in their coursework and approach learning through a variety of group and individual options, including academic coaching, peer tutoring, and more. The Center offers many opportunities for students to deepen their understanding of who they are as learners, communicators, and scholars. Their services and workshops are free to the CMU community and meet the needs of all disciplines and levels of study.

Finally, 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.

COURSE SCHEDULE AND TOPICS

Please note: In the schedule below, **required** and **recommended** readings are indicated with their full citation. On Canvas, you will find the respective files under the first author's last name and publication year. And did I mention that readings listed below should be completed ***prior*** to the class for which they are listed? That way we can discuss the related topics together during the lecture.

Also, please note that the first two weeks of readings are long, coalescing the discussion of the first week and providing background for future weeks. Please plan accordingly. I hope you will enjoy and learn from this course!

Lecture 1 (Monday, August 26)

Topic: Introduction

Readings: None

Lecture 2 (Wednesday, August 28)

Topics: Privacy, Security, and Anonymity

Readings:

- **Required:** Warren

 Download Warren, S. D., & Brandeis, L. D. (1890). The right to privacy. Harvard law review, 193-220.

 Recommended: Posner

 Download Posner, R. A. (1978). Economic theory of privacy. Regulation, 2, 19.

 Recommended: Solove

- Download Solove, D. J. (2005). A taxonomy of privacy. U. Pa. L. Rev., 154, 477.

Monday, September 3

Notes: No classes – Labor day! Since this particular week we will be meeting just once, please consider reading this illuminating article (related to Lecture 2) in lieu of class: Moore

Download Moore, A. D. (2003). Privacy: its meaning and value. American Philosophical Quarterly, 40(3), 215-227.

Lecture 3 (Wednesday, September 4)

Topic: Psychology and Behavior

Readings:

- **Required:** Acquisti

 Download Acquisti, A., Brandimarte, L., & Loewenstein, G. (2015). Privacy and human behavior in the age of information. Science, 347(6221), 509-514.

 Recommended: Altman

 Download Altman, I. (1977). Privacy regulation: Culturally universal or culturally specific?. Journal of social issues, 33(3), 66-84.

 Recommended: Solove

- Download Solove, D. J. (2021). The myth of the privacy paradox. Geo. Wash. L. Rev.

Notes: Remember to start proposing ideas for your projects to Alessandro and the TA

Lecture 4 (Monday, September 9)

Topic: Privacy Intrusive Technologies - I

Readings:

- **Required:** Cranor

 Download Cranor, L. F., Sleeper, M., & Ur, B. (2013), Tracking and Surveillance. Mimeo.

 Recommended: Froomkin

 Download Froomkin, A. M. (1999). The death of privacy. Stan. L. Rev., 52, 1461. **(Only section I)**

 Recommended: Narayanan

- Download Narayanan, A., & Shmatikov, V. (2010). Myths and fallacies of “personally identifiable information". Communications of the ACM, 53(6), 24-26.

Lecture 5 (Wednesday, September 11)

Topic: Privacy Intrusive Technologies - II

Readings:

- **Required:** Calo

 Download Calo, R. (2011). The boundaries of privacy harm. Ind. LJ, 86, 1131.

 Recommended: Solove

- Download Solove, D. J. (2007). I've got nothing to hide and other misunderstandings of privacy. San Diego L. Rev., 44, 745.
- **Recommended:** United States
- Download United States. Executive Office of the President, & Podesta, J. (2014). Big data: Seizing opportunities, preserving values. White House, Executive Office of the President.

Notes: Homework 1 due

Lecture 6 (Monday, September 16)

Topic: Privacy Technologies - I

Readings:

- **Required:** Goldberg

 Download Goldberg, I. (2007). Privacy enhancing technologies for the Internet III: Ten years later. Digital Privacy: Theory, Technology, and Practices, 3-18.

 Recommended: Phillips

 Download Phillips, D. J. (1998). Cryptography, secrets, and structuring of trust. In: Technology and Privacy: The New Landscape. The MIT Press, Cambridge, MA, 243-276.

 Recommended: Shen

- Download Shen, Y., & Pearson, S. (2011). Privacy enhancing technologies: A review. HP Laboratories, 2739, 1-30.

Lecture 7 (Wednesday, September 18)

Topic: Privacy Technologies – II

Readings:

- **Required:** Ohm

 Download Ohm, P. (2009). Broken promises of privacy: Responding to the surprising failure of anonymization. UCLA l. Rev., 57, 1701.

 Recommended: Brin

- Download Brin, D. (1996). Excerpt from The Transparent Society. Wired magazine.

Notes: Remember to finalize ideas for your projects with Alessandro and the TA

Lecture 8 (Monday, September 23)

Topic: Privacy and the Legal System: US

Readings:

- **Required:** Solove

 Download Solove, D. J. (2016). A brief history of information privacy law. Proskauer on privacy, PLI.

 Recommended: Bamberger

- Download Bamberger, K. A., & Mulligan, D. K. (2010). Privacy on the Books and on the Ground. Stan. L. Rev., 63, 247.

Lecture 9 (Wednesday, September 25)

Topic: Comparative Legal Approaches to Privacy and Self-Regulation

Readings:

- **Required:** EU Court of Human Rights,

 Download EU Court of Human Rights, Fact Sheet on the 'Right to be Forgotten' ruling. (C-131/12).

 Recommended: Samuelson

- Download Samuelson, P. (2000). Privacy as intellectual property?. Stanford Law Review, 1125-1173.

Notes: Homework 2 due

Lecture 10 (Monday, August 30)

Topic: Privacy and Economics I

Readings:

- **Required:** Acquisti

 Download Acquisti, A., Taylor, C., & Wagman, L. (2016). The economics of privacy. Journal of Economic Literature, 54(2), 442-92.

 Recommended: Einav

- Download Einav, L., & Levin, J. (2014). Economics in the age of big data. Science, 346(6210).

Lecture 11 (Wednesday, October 2)

Topic: Privacy and Economics II

Readings:

- **Required:** Rubin

 Download Rubin, P. H., & Lenard, T. M. (2001). Privacy and the commercial use of personal information.

 Recommended: Arrieta-Ibarra

 Download Arrieta-Ibarra, I., Goff, L., Jiménez-Hernández, D., Lanier, J., & Weyl, E. G. (2018, May). Should We Treat Data as Labor? Moving beyond "Free". In AEA Papers and Proceedings (Vol. 108, pp. 38-42).

 Recommended: Lenard

- Download Lenard, T. M., & Rubin, P. H. (2015). Big Data, Privacy and the Familiar Solutions. JL Econ. & Pol., 11, 1.

Notes: Consider sending draft outlines for your project to Alessandro and the TAs for feedback

Lecture 12 (Monday, October 7)

Topic: Privacy and Online Social Networks

Readings:

- **Required:** Guess

 Download Guess, A. M., Malhotra, N., Pan, J., Barberá, P., Allcott, H., Brown, T., ... & Tucker, J. A. (2023). Reshares on social media amplify political news but do not detectably affect beliefs or opinions. Science, *381*(6656), 404-408.

 Required: Allcott

 Download Allcott, H., Braghieri, L., Eichmeyer, S., & Gentzkow, M. (2020). The welfare effects of social media. American Economic Review, *110*(3), 629-676.

 Recommended: Marwick

 Download Marwick, A. E., & Boyd, D. (2014). Networked privacy: How teenagers negotiate context in social media. New media & society, 16(7), 1051-1067.

 Recommended: Stutzman

 Download Stutzman, F. D., Gross, R., & Acquisti, A. (2013). Silent listeners: The evolution of privacy and disclosure on Facebook. Journal of privacy and confidentiality, 4(2), 2.

 Recommended: Wilson

- Download Wilson, R. E., Gosling, S. D., & Graham, L. T. (2012). A review of Facebook research in the social sciences. Perspectives on psychological science, 7(3), 203-220.

Notes: Homework 3 due

Lecture 13 (Wednesday, October 9)

Final project presentations

Friday, October 11

Final Projects due