Meeting times and location: *Mondays 3-5:30pm in Robinson 107*

â€œThe Dark Arts are many, varied, ever-changing and eternal. Fighting them is like fighting a many-headed monsterâ€¦. Your defenses must therefore be as flexible and inventive as the arts you seek to undo.â€ (from Harry Potter and the Half-Blood Prince.)

Today, we are all surrounded by those who would wield the dark arts of cyber against us. They want to steal our data and our money, turn our computers against us, and ultimately upend our lives.

This seminar is designed to help computer users of all skill levels understand the threats we face and embark on the design and creation of our own personal defenses. Using a case-based approach, we will explore real-world threats against our phones and laptops, access-control systems, networks, institutions and our world in general. Students progress from reading popular accounts of computer security to reading academic literature. Practical exercises promote mastery of defensive techniques.

Each 2Â½ hour class will include an hour-long discussion, a break, and then a hands-on lab. The seminar is taught by two senior computer scientists who provide students with one-on-one instruction and personalized assignments, some of which may involve original research.

Goals include learning how to critically read both popular and academic literature, how to read and research a vulnerability report, how to discuss and analyze technical issues that are morally ambiguous, and how to help those who do not possess cybersecurity skills â€” computingâ€™s equivalent of muggles.

Prerequisites*:* This course is designed to appeal to both students with no background in cybersecurity and those who competed in their high school cybersecurity clubs. Having two faculty members means that we will be well-positioned to give students one-on-one attention during the second half of each class.

This is a First-Year Seminars, which are available only to first-year students in Harvard College. You may apply to this seminar via the FYS lottery between July 15 and August 19, 2024 (applications close at 11 am).

Textbooks (available on the course's Perusall site):

- *Fancy Bear Goes Phishing: The Dark History of the Information Age in Five Extraordinary Hacks* by Scott J. Shapiro (2023) (entire book)
- *This Is How They Tell Me the World Ends: The Cyberweapons Arms Race* by Nicole Perlroth (2021) (selected chapters)
- *Crypto: How the Code Rebels Beat the Government Saving Privacy in the Digital Age* by Steven Levy (2002) (selected chapters)

We'll also distribute selected academic papers through the course Perusall site.

Course Outline

Week 1 â€” A Hackerâ€™s Bestiary 1: The Great Worm and Computer Viruses

Week 2 â€” A Hackerâ€™s Bestiary 2: The Wizards

Week 3 â€” Passwords

Week 4 â€” Biometrics and Transfiguration

Week 5 â€” Cryptography 1 â€” Secret Key Cryptography (the oldest of the dark arts)

Week 6 â€” Cryptography 2 â€” Public Key Cryptography (protecting data with math)

Week 7 â€” Keeping Your Data Out of Azkaban (Ransomware and Malware)

Week 8 â€” Finding Spells in the Library: Learning to read the Computer Security Literature

Week 9 â€” Your Cloak of Invisibility

Week 10 â€” Sneaking through the forest

Week 11 â€” Securing your broom

Week 12 â€” Really Powerful Magic (the law)

[full calendar]

Course Details

Instructional staff

	Email	Office Hours:	Where
Mike Smith	mike_smith@harvard.edu	By Appointment	SEC 4.302
Simson Garfinkel	sgarfinkel@fas.harvard.edu	By Appointment	SEC LL1.207

Learning goals

By the end of this course, students will:

- Know how they can protect their computers and their information.
- Know how to give basic protection information to friends and family.
- Know what they should report, and how to report it.
- Know when to be suspicious.
- Know how to act when you are living your normal life, and how to change what you are doing if you are being explicitly targeted.
- Understand how computer security is viewed in the technology industry, by american businesses, and governments.

Course organization

The course is structured around **shared readings done prior to each class** and **in-person discussions where we explore, make mistakes, and learn together**. Unless you have permission in advance to miss class, **you are expected to attend every scheduled class session**.

And on this topic, please make sure you have read our handout titled â€œGuidelines for Class Discussionsâ€ and the section below on diversity and inclusion.

Beyond our class discussions, this course requires you bring a computer to class on which you can participate in the in-class exercises. We will provide additional hardware if and when it is required. For the final class you will be expected to create a few slides. There are **no exams**.

You will find the reading assignments on the course calendar and by following the Perusall link in the navigation bar to the left and then select the Assignments tab in Perusall.

Canvas and Perusall. All course interactions will take place through one of these two online tools. You should access the class instance of Perusall through the sidebar.

Weâ€™ve found it helps if we tell you the purpose of each tool:

- If youâ€™re looking for general information about the class, its syllabus, a listing of the assignments, how we will grade you, or other course policies, you should visit our **Canvas** class site.
- If you want to ask a question about the course, the class schedule, or specific assignments, you should post your questions on the Canvas discussion board.
- All readings in this course will appear in our **Perusall** class site. You should do the readings before the class for which theyâ€™re assigned. We use Perusall so that you can discuss your thoughts on each reading with your student peers.

Perusall-specific notes. To get the most out of Perusall, we recommend that you:

- Use Perusall to annotate the readings with your questions and initial thoughts BEFORE class. The â€œAssignmentsâ€ tab in Perusall tells you when readings are due.
- Respond to the thoughts and questions posted by your classmates.
- Treat Perusall as **shared space**. You should feel free to engage in discussions with the other students, and the professors may join you!
- Remember to **always be respectful** in your comments on Perusall.
- Ignore anything about the â€œMy Scoresâ€ part of Perusall. We donâ€™t use it.

Before each class, the faculty will review what has been posted by you and your classmates. We do this because we use what youâ€™ve written to help focus on classes on what is of interest to you or where youâ€™ve had questions. As such, we greatly appreciate it when you do the reading and post their responses by 7am on the day of class. Thank you!

Grading

This class is graded using Harvard's SAT/UNS scale. If you do the readings, come to class and participate in discussions, you will get a SAT.

Academic integrity

The expectations in this class are that you will do the reading. If you cannot finish the reading, please do not try to bluff your way through the discussion. Don't misrepresent your lack of preparation, but do your best to be constructive.

For the in-class assignments, please do not use Google or an AI tool to find the answersâ€”do the work yourself. In this class, we have no objection, however, to your using Google or an AI tool to produce sample code or to get insight into how to use a command-line tool. Just let us know if you use a tool: don't claim the tool's work as your own.

Generative artificial intelligence (GAI). The use of GAI tools, such as ChatGPT and Copilot, is **allowed unless otherwise stated**. However, you should never use a GAI tool to do your entire assignment. Use it as a tool to assist you in writing or help you in coding. Because the use of these tools is new and our policies are evolving, any such **use must be acknowledged when you present and discuss your work.**

If you have any questions about our academic integrity policy, please come see Professor Smith or Dr. Garfinkel. We encourage high-level collaboration with your peers and experimentation with GAI tools. This is a new world, and we'll all be figuring out how to best to navigate it. We hope you will share with us some of the interesting ways you accelerated your learning through collaboration and the use of GAI. If you're not sure if your use case falls within course policy, come to talk to any member of the course staff.

Diversity, inclusion, and accommodations

It is our goal to create a learning environment in this class that supports diversity of thought, perspective, experience, background, and honors your identity no matter what that might be. We (like many others) believe we are in a continual state of learning about diverse perspectives and identities. If something is said in the class, by the instructors or anyone else, that makes you feel uncomfortable, please let us know.

If your performance in class is being impacted by your experience outside of the class, please don't hesitate to come talk with any of the instructors. As a participant in the course discussion, you should strive to honor the diversity and experience of your classmates. This is especially true in this course, where there are very few right and wrong answers. We will be talking about personal values, which rightfully differ from person to person. Listen to those with whom you disagree and try to understand why they are holding the position they hold. Be a generous listener. You don't have to agree with what someone else says, but we all should work hard to understand and respect each other.

Finally, if there is any reasonable accommodation that you need, please speak with any member of the course staff, or check out the full list of available support resources (link in the navigation bar).

Help! What to do if you can't make class or if something happens...

As the semester proceeds, it is possible that you will find that **you cannot attend class**. If this occurs, please send a note to Professor Smith **before** the class you'll miss. You should do the readings, attempt the lab, and find out from a friend in the course what you missed in that day's discussion.

It is also possible that the College might cancel classes on a day we meet (e.g., for a snow emergency). We'll adjust. Please look for an email from the instructors on whether we'll meet by Zoom (less than ideal) or cancel class.

We hope that each of you and your loved ones remain healthy this semester, but **if you fall ill or need to care for sick family members**, please know that your health always comes first. Then contact the instructional staff, **as soon as you are able**, so that we can make accommodations.

If you ever discover that you **need help with your writing** during your time at Harvard, please take advantage of the Harvard College Writing Center.

Remember, as we state in the â€œDiversity, Inclusion, and Accommodationsâ€ section of the course syllabus, â€œif there is any reasonable accommodation that you need for any reason, [please do not hesitate to contact] any member of the course staff.â€ We promise to do our best to create an effective and engaging learning environment, but if something isnâ€™t working for you, please let us know as soon as possible so that we can work together.

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