



CCTP-5021: Computing and the Meaning of Code
Communication, Culture & Technology Program
Georgetown University

Spring 2024

Professor: Martin Irvine
Email: irvinem@georgetown.edu

Time and Dates: Monday 11:00AM-1:30PM

Location: Lauinger 110 (Idea Lab)

Course Resources: Web Syllabus, Online Library, Online Platforms

Students will participate in the course with a suite of Web-based platforms and e-text resources:

- (1) **A custom-designed Website** created by the professor for the course syllabus, links to readings, and weekly assignments: <https://irvine.georgetown.domains/5021/>
- (2) **An E-Text Course Library** in a shared Google Drive Folder. Most course readings (and research resources) will be available in pdf format prepared by the professor and available for download and/or online reading in Google Drive (GU Google account).
- (3) **Google Docs, Slides.** Students will also create and contribute to shared, annotatable Google Docs files for certain assignments and dialogue (both during synchronous online class-time, and working on group projects outside of class-times).
- (4) The **Canvas** Discussion platform for weekly discussion posts and shared course materials.
- (5) **Zoom** video conferencing for virtual office hour meetings (when necessary).

Professor Contact Information: email: irvinem@georgetown.edu

Office Hours: Before class meetings, and by appointment. I will also set up Virtual Office Hour times during the week for “drop-in” Zoom sessions.

Office Location: 311 Car Barn



COURSE DESCRIPTION

This course introduces the key concepts for understanding everything we call “code” (i.e., how we use *symbolic systems*) in ways that apply directly to any professional career where knowledge of the key concepts in computing, information, data, and software are important for leadership roles. Although many kinds of computing devices, applications, and data resources are essential in everyday practice in every field, few people have the opportunity to learn the “why” and “how” beyond just knowing “how to” as a user of various hardware and software systems. This course opens up the key concepts that make computing *possible* and *explainable*. You will learn why everything we do in computing is connected to a much longer history of human symbolic thought and all the forms of human communication and representation. This includes how we use our symbolic capacity for abstraction (thinking in different levels) in order to design technologies that can represent, “encode,” and interpret (process, compute) human symbolic processes *physically*. With the methods and concepts in this course, you will be able to open up a big “black box” we call “code” – not only for computing and programming “languages,” but for all our “systems of meaning,” from language, mathematics, and images to the binary encoding systems for all types digital data and software itself.

The course is designed especially for students from non-technical backgrounds. But if you have done some computer coding already, you will understand more clearly *how* and *why* programming languages and digital media are *designed* the way they are, and *how* and *why* we can use “code” in one form (in the “digital language” of computers) for representing, processing, interpreting, and transmitting all forms of the “primary code” of human thought and expression (in words, images, numbers, graphics, sounds, and video).

We will follow a CCT interdisciplinary approach that allows us to “crack the code” for how everything in computing is based on our shared human symbolic capacity, and how and why computer systems and digital data are designed to serve one or more of our symbolic forms of expression and representation (language, text, numbers, graphics, images, sounds). How is it possible to design systems that make “encoded” representations of all these forms of human expression *computable*? What does it mean for something to *be* computable? By the end of the course, you will be able to meaningfully answer these questions (and more). To get there, we will draw from key concepts and methods developed in disciplines devoted to the study of human symbolic thought and the kinds of “code” understood in all branches of computing: philosophy and logic, information theory, computer science, linguistics, design thinking, systems thinking, semiotics (the study of symbol systems), and cognitive science.

In this course, you will also learn about computing and symbolic systems in two parallel paths: by learning the ideas that made our digital computing systems possible, and by actually seeing how it all works in “hands on” practice with devices, software, programming code, and Internet apps. By focusing on the essential background for answering the “why” and “how” questions, you will also gain a new motivation for applying this understanding to the “how to” side of programming (if you want to learn how to code or work with others in designing applications).



COURSE LEARNING OBJECTIVES AND OUTCOMES

By the end of the course, you will be able to:

- (1) Understand how the coding and logic of computer systems and digital information are based on our core human symbolic capabilities, and how and why the design principles for computer systems and digital media connect us to a longer continuum of symbolic thought, expression, and communication in human cultures;
- (2) Use the foundational knowledge of this course to go on to learning programming in a specific programming language and in a specific domain of application, if you want to develop these skills;
- (3) Apply the knowledge and concepts of this course to developing a leadership-level career in any kind of organization where you will be a knowledgeable “translator” of computational concepts: you will be able to help those without technical backgrounds to understand how computing is used in your field, and be a communicator with people responsible for computing and information systems (“IT”) who need to understand the needs and roles of others in your organization. This “translator” role is in big demand, and one that many CCT students have gone on to develop great careers.

COURSE READINGS AND REQUIRED BOOKS

Many of the course readings are provided as pdf documents linked in each week unit on the course syllabus website: <https://irvine.georgetown.domains/5021/>

There are two required books, from which I have relevant sections in pdfs in the e-text library. These books will be at the GU bookstore, but, of course, you can get them from online sellers as well. The most important book: you should your own copy of Denning and Martell (2015) for ongoing reference and your own annotations.

- Peter J. Denning and Craig H. Martell. *Great Principles of Computing*. Cambridge, MA: The MIT Press, 2015.
- Janet Murray, *Inventing the Medium: Principles of Interaction Design as a Cultural Practice*. Cambridge, MA: The MIT Press, 2012.



COURSE ASSIGNMENTS AND GRADING CRITERIA

Assignments and Grading

Week Unit Assignments: For each week, students will write a short reflection essay posted on Canvas on the readings and research sources of the week. Follow the instructions for questions and topics to write about. Your post should also include questions and asking for more explanations of topics in class. (Remember: if you have a question or don't understand something, you won't be alone. Most of what we study will probably be new to you, so never be afraid to ask questions!)

Students will also write a final research paper in which you apply the methods and learning in the course to a topic or question that want to learn more about (formats will be discussed later).

Final grades will be based on:

- (1) Class participation: weekly writing assignments, and group projects (as assigned) (50%).
- (2) A final research project based on applying the concepts and methods of the course to a topic that you want to research further. (50%).

Weekly Assignments and Discussions in Canvas

All readings and assignments are to be completed during the week before the numbered week units. Each week unit defines what we will be covering in class discussions for that week.

Weekly writing assignments must be posted in Canvas **at least 6 hours before class**, so that all class members can review each other's work and be prepared for discussion in class.

COURSE SCHEDULE

This course is divided into 14 weekly modules. For more information on the course structure and assignments, see the course website: <https://irvine.georgetown.domains/5021/>

Course Outline:

See the [course website](#) for the content of each week unit in this topic outline. Note: Contents of units are subject to revision. The updated syllabus outline and content will always be on the course website.

Week 1: Course Introduction: Methods, Key Concepts: "Code" and Symbolic Systems

Week 2: Introduction to Our Interdisciplinary Approach: Key Concepts and Main Topics

Week 3: The Human Symbolic Capacity: Symbolic Thought, Symbol Systems, Technologies

Week 4: A Unified Theory of Symbolic Systems: Introducing Semiotic Theory

Week 5: What is (a) Language? "Formal Language"? "Code," "Programming Language"?



- Week 6: Information, Communication, Data, and Meaning (1): What is “Information”
- Week 7: Information, Communication, Data, and Meaning (2): What is “Data”?
- Week 8: Computer System Design Principles (1): Symbols, Code, and Automation
- Week 9: Intro to Coding (1): Computational Thinking, Programming & Coding Languages
- Week 10: Intro to Coding (2): Programming & Working with Symbols and Delegated Actions
- Week 11: Interface Design: Coding for Interaction & the Computer as Metamedium
- Week 12: The Internet and Web: Network Systems and Code for Data and Metamedia
- Week 13: Summing Up and Learning Outcomes; Preparing for Final Projects
- Week 14: Discussion and Presentation of Final Projects

COURSE POLICIES AND EXPECTATIONS

Student Expectations

This course will be conducted as a seminar and requires each student’s direct participation in the learning objectives in each week’s course unit. Each syllabus unit is designed as a building block in the interdisciplinary learning path of the course, and students will write weekly short essays that reflect on and apply the main concepts and approaches in each week’s unit.

You are expected to complete all readings, assignments, and activities **on time before each class meeting**. In order to get credit for participation, you must complete all assignments on time.

Participation is thus essential to your success in this class. You are expected to actively participate in weekly discussions with fellow students (online and in-class), and to contribute to group assignments.

Time Expectations

Students should plan on spending approximately **10 hours per week** on the work for each week unit.

Communication Expectations

Communication with the Professor

I will email students with updates to weekly readings and assignments, and other course matters, during the course. You are expected to read all email communications from the professor, and follow updates, additional instructions, or suggestions.

You can email me any time with your questions, concerns, and/or to schedule a time to meet (in my office or over Zoom). I will answer all student email messages within 24 hours.



Communication with Classmates

You will be expected to engage with your fellow classmates via the Canvas Discussions platform, and on other platforms as assigned (e.g., Google docs).

Discussion Guidelines

A graduate course is an open space to also learn from each other and to consider different points of view and experiences from different backgrounds. For that purpose, we ask each student to respect the opinions and thoughts of other students and be courteous in the way you express yourself, especially if you disagree. Students (with the professor) must commit to being respectful and considerate of all opinions, but we can also all expect that varying points of view can be supported with evidence or with reasons for differing interpretations, and not simply argued as a matter of personal preference or ideology.

LEARNING AND RESEARCH RESOURCES

Georgetown Library & Resources for Learning and Research

The Georgetown Library is one of the best in the US. As soon as possible, get to know how to search for books and articles from the library's main page:

<https://library.georgetown.edu/>

Increasingly, publishers are providing books and journals in etext form, and Georgetown Library subscribes to most of the sources you will need for your studies.

If you have a question for a librarian you can go to their “Ask Us” page where you will have the option to chat online, send an email, or schedule a Zoom appointment to discuss a research topic, develop a search strategy, or examine resources for projects and papers. Librarians offer an overview of and in-depth assistance with important resources for senior or master's theses, dissertations, papers and other types of research. This service is available to currently enrolled students who need assistance with Georgetown-assigned projects and papers. Please review the [Services & Resources Guide for Online Students](#) for additional information.

Students enrolled in courses have access to the University Library System's eResources, including 500+ research databases, 1.5+ million ebooks, and thousands of periodicals and other multimedia files (films, webinars, music, and images). You can access these resources through the [Library's Homepage](#) by using your NetID and password.

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Learning Resources

Georgetown offers a host of [learning resources](#) to its students. Two that you might find particularly helpful in this course are the [Writing Center](#) and [Refworks](#).

- [The Writing Center](#) offers peer tutoring by trained graduate and undergraduate students who can assist you at any point in the writing process. They help at any stage of your writing process, from brainstorming to revision. Tutors can offer advice on thesis development, use of evidence, organization, flow, sentence structure, grammar, and more.



The Writing Center will not proofread or edit papers; rather, they will help to improve your proofreading and editing skills to become a better writer. Appointments can be booked online through their website.

- [Refworks](#) is an online research management tool that aids in organizing, storing, and presenting citation sources for papers and projects.

Technical Support for Canvas

All students have 24/7 access to Canvas technical support 24 hours a day, 7 days a week, including live chat and a support hotline at 855-338-2770. Use the 'Help' icon in the lower left of your Canvas window to view all available support and feedback options. If you're looking for help on a specific feature, check out the [Canvas Student Guide](#).

UNIVERSITY POLICIES AND SERVICES

Academic Integrity

Students at Georgetown University are expected to maintain the highest standards of academic and personal integrity. Although most Georgetown students conduct themselves in accordance with these standards, occasionally, there are students who violate the code of conduct.

Academic dishonesty in any form is a serious offense, and students found in violation are subject to academic penalties that include, but are not limited to failure of the course, termination from the program, and revocation of degrees already conferred. All students are expected to fully adhere to the policies and procedures of [Georgetown's Honor System](#) and to take the Honor Code Pledge:

Honor Code Pledge

In pursuit of the high ideals and rigorous standards of academic life I commit myself to respect and to uphold the Georgetown University honor system; to live out a commitment to integrity in all my words and actions; to be honest in every academic endeavor; and to conduct myself honorably, as a responsible member of the Georgetown community as we live and work together; to live out the ideals of Georgetown University I commit myself to be a person for others in my daily life, respectful of difference and disagreement; To care for this venerable campus and all of those with whom I share it; and to fulfill in all ways the trust placed in me to carry on the Georgetown tradition.

Plagiarism

Stealing someone else's work is a terminal offense in the workplace, and it will wreck your career in academia, too. Students are expected to work with integrity and honesty in all their assignments. The Georgetown University Honor System defines plagiarism as "the act of passing off as one's own the ideas or writings of another." More guidance is available through the [Gervase Programs](#). If you have any doubts about plagiarism, paraphrasing, and the need to credit, check out [Plagiarism.org](#).



All submissions for assignments must be your original work. Acknowledge quoted and cited text, diagrams, and images from your sources in a standard reference citation format. Any submission suspected of plagiarism will be immediately referred to the Honor Council for investigation and possible adjudication. All students are expected to follow Georgetown's honor code unconditionally. If you have not done so, please read the honor code material located online at the [Honor Council website](#).

ACCOMODATIONS AND CONDUCT POLICIES

Students with Disabilities

Under the Americans with Disabilities Act (ADA) and the Rehabilitation Act of 1973, individuals with disabilities have the right to specific accommodations that do not fundamentally alter the nature of the course. Some accommodations might include note takers, books on tape, extended time on assignments, and interpreter services among others. Students are responsible for communicating their needs to the [Academic Resource Center](#), the office that oversees disability support services, (202-687-8354):

arc@georgetown.edu; <https://academicsupport.georgetown.edu/disability/>

before the start of classes to allow time to review the documentation and make recommendations for appropriate accommodations.

The University is not responsible for making special accommodations for students who have not declared their disabilities and have not requested an accommodation in a timely manner. For the most current and up-to-date policy information, please refer to the [Georgetown University Academic Resource Center website](#). Students are highly encouraged to discuss the documentation and accommodation process with an Academic Resource Center administrator.

Accessibility and Inclusion

One of the central tenets of Georgetown's educational mission is *cura personalis*, a Latin phrase meaning "care of the whole person." Georgetown is committed to showing care and concern for each student by creating an inclusive and accessible learning environment that follows universal design principles to meet the needs of its diverse student body.

I am committed to creating a learning environment for my students that supports a diversity of thoughts, perspectives and experiences, and honors your identities (including race, gender, class, sexuality, religion, ability, etc.). If your name or pronoun needs to be corrected, please let me know early in the semester so that I can make the appropriate changes to my records.

Title IX/Sexual Misconduct

Georgetown University and its faculty are committed to supporting survivors and those impacted by sexual misconduct, which includes sexual assault, sexual harassment, relationship violence, and stalking. Georgetown requires faculty members, unless otherwise designated as confidential, to report all disclosures of sexual misconduct to [the University Title IX Coordinator or a Deputy Title IX Coordinator](#). If you disclose an incident of sexual misconduct to a professor



in or outside of the classroom (with the exception of disclosures in papers), that faculty member must report the incident to the Title IX Coordinator, or Deputy Title IX Coordinator. The coordinator will, in turn, reach out to the student to provide support, resources, and the option to meet. Please note that University policy requires faculty to report any disclosures about sexual misconduct to the Title IX Coordinator, whose role is to coordinate the University's response to sexual misconduct.

Georgetown has a number of fully confidential professional resources who can provide support and assistance to survivors of sexual assault and other forms of sexual misconduct. These resources include:

- Jen Schweer, MA, LPC, Associate Director of Health Education Services for Sexual Assault Response and Prevention (202) 687-0323 | jls242@georgetown.edu
- Counseling and Psychiatric Services (CAPS), (202) 687-6985 | After Hours: (833) 960-3006
- Sexual Assault Response and Prevention (SARP) confidential email: sarp@georgetown.edu
- [Get Help Resources](#)

More information about reporting options and resources can be found on the [Sexual Misconduct Website](#).

SUPPORT SERVICES

Georgetown offers a variety of support services for students that can be accessed online, and also [this newsletter](#), which will provide you with information about well-being resources and virtual meetings that can connect you with mental health professionals on and off campus during this time. Below are some resources available to you:

- [Academic Resource Center](#): 202-687-8354 | arc@georgetown.edu
- [Counseling and Psychiatric Services](#): 202-687-6985
- [Institutional Diversity, Equity & Affirmative Action \(IDEAA\)](#): (202) 687-4798