CCTP-711: Computing & the Meaning of Code

Dates: Jan. 17 – May 1, 2022

Time: Monday, 2:00-4:30PM

Location: Car Barn 318

Professor: Martin Irvine
Email: irvinem@georgetown.edu

Office Hours and Virtual Office Hours:

Office location: 311 Car Barn. Mondays 1-2PM, and by appointment. I will also be available most days after class meetings. I will set up Virtual Office Hour times during the week for "drop-in" Zoom sessions.

Syllabus and Learning Resources:

For supporting your weekly classroom learning, the professor has designed the following resources:

(1) **Main Syllabus**: A custom-designed Website for the syllabus, links to readings, and weekly assignments:

https://irvine.georgetown.domains/711

This site is the main syllabus for the course, not the Canvas site.

(2) **An e-text course library** and shared Google Docs: most readings (and research resources) are available in pdf format in a shared Google Drive folder prepared by the professor (see links in the Web Syllabus).

(3) A course discussion forum in WordPress for weekly writing assignments.

COURSE DESCRIPTION

This course introduces the key concepts for understanding everything we call "code" (i.e., interpretable *symbolic systems*) in ways that apply directly to any professional career. Computing and data resources are now essential in every professional field, but few people have the opportunity to learn the key design principles of computing systems, where the ideas for computation come from, and why everything we do in computing is connected to a much longer history human symbolic thought and to the symbolic systems we use in all forms of communication and representation. With the methods and concepts in this course, you will be able to open up a big "black box" -- not only of computing and programming "languages," but of all our "systems of meaning," from language, mathematics, and images to the binary encoding systems for all types digital data.

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). In order to "crack the code" for how all symbolic systems work, you will learn methods and concepts from several disciplines, including: design thinking, systems thinking, semiotics (the study of symbol systems), cognitive science and philosophy, information theory, and computer science.

In this course, you will 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 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

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 ONLINE CODING COURSE

All of the course readings (in pdf) are provided with links in the week units on the course website: https://irvine.georgetown.domains/711/

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.

- Luciano Floridi, *Information: A Very Short Introduction*. Oxford, UK: Oxford University Press, 2010.

Online "Hands-On" Introduction to Programming

This course has very low expenses for books. There may be one other expense as a "lab" fee: subscribing to an online "Introduction to Programming" course for a hands-on learning experience in writing code in a programming language. This hands-on component of the course will be in Weeks 10-11. It's fun, and you can just dive in!

There are several good online learning services (and the courses and services are always changing). We will probably use the online courses from LinkedIn Learning (which is free for GU students).

I will announce the online course to sign up for in first weeks of the course. You will be able to learn at your own pace, and bring your experience and questions to class.

COURSE ASSIGNMENTS AND GRADING CRITERIA

Graded Assignments

Grading will be based on:

(1) Class participation: weekly writing assignments and group projects (50%).

(2) An individual final research essay or creative project based on applying the concepts and methods of the course (50%).

How to fulfill the evaluation criteria ("rubrics") for each 50% of the grade will be included in the assignment descriptions in the Website syllabus.

COURSE SCHEDULE AND ASSIGNMENT DEADLINES

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/711/

Please note that **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.

Writing assignments must be posted or added to docs (as assigned) **at least 6 hours before class**, so that all class members can review each other's work and be prepared for discussion.

Course Outline:

See the course website for the content of each week unit in this topic outline. (Note: the contents of units in the website syllabus are always being updated for student interest and needs.)

Week 1 (Jan 17): Intro to the Course: Learning Resources, Methods, Key Concepts

Week 2 (Jan 24): Methods and Key Concepts: Symbol Systems, Codes, and Design of Technologies

Week 3 (Jan 31): The Human Symbolic Capacity: Symbolic Thought, Language, Math, Media

Week 4 (Feb 7): A Unified Theory of Symbolic Systems: Intro to Semiotic Theory

Week 5 (Feb 14): What is (a) Language? "Formal Language"? "Programming Language"?

Week 6 (Feb 21): Computer System Design Principles (1): Symbols, Code, and Automation

Week 7 (Feb 28): Computer System Design Principles (2): Computation, Levels, Programming

Week 8 (Mar 14): Information, Communication, Data, and Meaning (1): What is "Information"

Week 9 (Mar 21): Information, Communication, Data, and Meaning (2): What is "Data"?

Week 10 (Mar 28): Interface Design: Coding for Interaction & the Computer as Metamedium

Week 11 (Apr 4): Coding Tutorial: Intro to Programming (online): Computational Thinking

Week 12 (Apr 11): Coding Tutorial: Intro to Programming (online): Discoveries with Code

Week 13 (Apr 25): Some Conclusions: Computing, Code, Symbolic Systems, Interfaces

Week 14 (Apr 25): Wrap Up and Discussion of Final Projects

Final Project due date: May 14.

COURSE POLICIES AND EXPECTATIONS

Expectations of Students

This course will be conducted as a seminar and requires each student's direct participation in the learning objectives for each week. Participation – both in preparation outside class and discussion in class -- is thus essential to your success in the course. You are expected to complete all readings, assignments, and activities **on time before each class**.

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. Students will also work in teams and groups on collaborative in-class projects and group presentations prepared before class meetings.

Time Expectations

Students should plan on spending *at least* **8-10 hours per week** on the work for each week unit. In order to get full credit for participation, you will have to complete all of your assignments on time.

UNIVERSITY POLICIES AND PROVISIONS

ACCOMMODATIONS

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. Also, the University need not modify course or degree requirements considered to be an essential requirement of the program of instruction. 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.

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. Cheating harms the University community in many ways. For example, honest students are frustrated by the unfairness of cheating that goes undetected and students who cheat can skew the grading curve in a class, resulting in lower grades for students who worked hard and did their own work. 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 must be your original work. 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.

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 the student is not required to meet with the Title IX coordinator.].

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
- Erica Shirley, Trauma Specialist, Counseling and Psychiatric Services (CAPS), (202) 687-6985 | els54@georgetown.edu

More information about reporting options and resources can be found on the Sexual Misconduct Website.

Title IX/Pregnancy and Parenting Accommodations

Georgetown University is committed to creating an accessible and inclusive environment for pregnant and parenting students. Students may request adjustments based on general pregnancy needs or accommodations based on a pregnancy-related complication. Specific adjustments will be handled on a case by case basis and will depend on medical needs and academic requirements. Students seeking a pregnancy adjustment or accommodation should follow the process laid out on the Title IX website.

Discrimination based on sex, including sexual misconduct and discrimination based on pregnancy or parenting status, subverts the University's mission and threatens permanent damage to the educational experience, careers, and well-being of students, faculty, and staff.

Learning and Research Resources

Georgetown Library

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.

eResources

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.

Writing and Reference 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

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.

HEALTH AND WELL-BEING SUPPORT SERVICES

Georgetown recognizes that COVID-19 has a significant impact on everyone in the Georgetown community. Georgetown offers a variety of support services for students that can be accessed online and has put together this newsletter which aims to 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