

**CCTP-820: Leading by Design: Design Principles of Technical and Social Systems**

**Professor:** Martin Irvine

**Time and Dates:** Thurs. 11:00AM-1:30PM | Jan. 12- April 27, 2023

**Location:** Car Barn 318

**Course Resources:**

In addition to in-class discussions and exercises, 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 syllabus, links to readings, and weekly assignments: <https://irvine.georgetown.domains/820/>
- (2) An e-text course library and access to shared Google Docs: most readings (and research resources) will be available in pdf format in a shared Google Drive folder prepared by the professor. Students will also create and contribute to shared, annotatable Google Docs for certain assignments and dialogue (both during synchronous online class-time, and working on group projects outside of class-times).
- (3) The Canvas Discussion platform for weekly assignments.
- (4) Zoom video conferencing for virtual office hour meetings (when necessary).

**Professor's Contact Information:** email: [irvinem@georgetown.edu](mailto:irvinem@georgetown.edu)

**Office Hours:** Before class meetings, and by appointment.

## COURSE DESCRIPTION

This course is for all students who want to participate as thought leaders in any career path by learning *systems design thinking*. Design and systems thinking reveals how universal principle of design are implemented in all our computational and networked technologies, and how they work in all the uses in every social or organizational context (including public policy, software applications and interface design, education, business, and art). To become thought leaders with our colleagues, we need to change our position from being merely *consumers* or *users* of “black-boxed” technologies to becoming *participants* in important real-world decision-making about using existing technologies or developing new applications. For decades, when companies and organizations had IT systems decisions to make, it was always just “let the techies figure it out.” We now know this is no longer a viable approach for any organization. You will learn why we all have a major *ownership stake* in design principles, how they are implemented in tech products, why computing devices, platforms, and services seem “blackboxed” and closed from understanding, and how you can use design knowledge to participate at higher levels in any career path you pursue.

What’s missing in almost all disciplines devoted to operational and instrumental development of technologies is the unifying cross-disciplinary knowledge of *design principles*; that is, keeping in view the underlying universal design principles that enable any computer system (small or large) or software application to work as *designed systems* that are *combinable* with other systems. With the methods and multidisciplinary knowledgebase provided in this course, all students -- especially those who think they are “non-techie” -- will be able understand our current “complex system” technologies in a whole new way. Students will learn how to use this knowledge for “de-blackboxing” systems and products whose design principles are artificially closed off and inaccessible to “consumers” and “users.” To open up the unifying design principles, we will focus on the “why,” “what,” and “how” questions, and not as much on the “how to” questions (e.g., not on learning a *specific* programming language or app).

As a CCT Core Methods course, the course will enable students to build up their own integrative, interdisciplinary method by combining the methods and knowledge from inter-related fields: systems theory (complexity, networks, modularity), design thinking, computational thinking, semiotic thinking, and recent cognitive science approaches to technology, artefacts, and interfaces. Students will learn the multi-layered extensible design principles behind everything from computation, digital media, and the Internet to the architecture of mobile devices, interactive real-time apps, and Cloud computing. By learning how questions, concepts, and research agendas are formed across several disciplines, students will learn how to develop new conceptual tools of analysis that are needed for the complex, multi-domain problems that we investigate in CCT, and will be prepared for leader roles in any future career context.

## COURSE LEARNING OBJECTIVES

By the end of the course, students will understand the key design principles being implemented in our core technologies, where they come from, how and why design principles have *consequences*, and how to apply this knowledge to new real-world contexts. Students will understand

how learning technologies through unifying design principles empowers us for more direct participation in questions about “technology” in any social or organizational context. Students will be able to “lead by design,” and no longer accept being merely consumers and users of technologies.

By the end of the course, students will have acquired:

- (1) the ability to explain the “why” and “how” of computer systems, software, digital media, and networked information with the unifying concepts in universal design principles (example: how and why computer systems, software, and networks are based on modular, multi-level design principles, and why this matters);
- (2) the ability to apply systems and design thinking for understanding the design principles of technologies as *technical-social systems* (example: why are the forces that we *can't* see -- e.g., standards, universal design principles, policy and regulation, intellectual property regimes, and histories of cumulative combinations of prior technologies -- the most powerful for enabling what we *can* see in any complex, modular technology like an iPhone); and
- (3) the ability to apply combinatorial design principles for imagining and developing new innovations and applications (example: how what you will learn will enable you to understand what is needed to design a new app if you aren't the coder, but will be able to *lead the design*).

## COURSE READINGS

Most of the course readings (in pdf) are provided with links in the week units on the course website: <https://irvine.georgetown.domains/820/>

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. You should get your own copy of Denning and Martell (2015) and Murray (2012), 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 H. Murray, *Inventing the Medium: Principles of Interaction Design as a Cultural Practice*. Cambridge, MA: MIT Press, 2012.

## COURSE ASSIGNMENTS AND GRADING CRITERIA

### Graded Assignments

Grading will be based on:

- (1) Class participation: weekly writing assignments and group projects (as assigned) (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

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/820/>

### Weekly Assignments and Canvas Discussions:

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.

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 Outline:** See the [course website](#) for updates for content of each week unit in this outline:

Week 1: Intro to Design Principles: Deblackboxing Design for Thought Leaders

Week 2: Introduction to Design Principles and Concepts: Systems and Architectures

Week 3: Managing Complex Systems: Modularity, Abstraction, Layers & Levels

Week 4: Defining Cognitive Artefacts and Cognitive-Symbolic Technologies

Week 5: Media, Mediation, Technical Artefacts, and Sociotechnical Systems

Week 6: Affordances, Interfaces, and Designing Interactions

Week 7: Information Theory: Understanding the Design of All Things Digital

Week 8: Principles of Computer Systems: Computational Thinking, Code, Design

Week 9: The Development of Computer System Interface Designs

Week 10: Design Principles of Interactive Computing: Interfaces for Agency

Week 11: The Internet: Key Design Principles and Extensible Futures

Week 12: Web Design Principles and Interfaces: Browsers to Mobile Apps

Week 13: Final Project Discussion and Individual Meetings with Professor

Week 14: Conclusion, Wrap Up, and Discussion of Final Projects

Final Project due date: May 6.



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

You are expected to complete all readings, assignments, and activities **on time before each class meeting**.

Participation is essential to your success in this class. You are expected to actively participate in weekly discussions with fellow students and to contribute to group assignments. In order to get full credit for participation, you will have to complete all of your assignments on time.

### Time Expectations

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

### Communication Expectations

#### *Communication with Peers*

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).

#### *Communication with the Professor*

Please feel free to email me with your questions, concerns, or to schedule a time to meet over Zoom. When sending emails please remember to follow the guidelines outlined below.

Note: most general questions can be answered by consulting the information in the course website.

- *Be patient.* If you have a concern and send me a message, you can expect a response within 1 day.
- *Specify subject.* Subject line should include the topic of the message and class title.
- *Greet & Close.* E-mails should begin with a formal greeting and end with you signing your name in all messages/emails.
- *Check your writing.* Proofread (i.e. grammar and spelling) your message before sending.

### *Netiquette Guidelines*

To promote the highest degree of education possible, we ask each student to respect the opinions and thoughts of other students and be courteous in the way that you choose to express yourself. Students should be respectful and considerate of all opinions.

In order for us to have meaningful discussions, we must learn to genuinely try to understand what others are saying and be open-minded about others' opinions. If you want to persuade someone to see things differently, it is much more effective to do so in a polite, non-threatening way rather than to do so antagonistically. Everyone has insights to offer based on his/her experiences, and we can all learn from each other. Civility is essential.

## LEARNING AND RESEARCH RESOURCES

### **Georgetown Library & eResources 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.

### **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

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. 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](#).

## ACCOMODATIONS

### 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](mailto: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.

## **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](mailto: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](mailto:sarp@georgetown.edu)
- [Get Help Resources](#)

More information about reporting options and resources can be found on the [Sexual Misconduct Website](#). If you would like to find out how recent changes to Title IX regulations are impacting Georgetown's policies and procedures, see [this video briefing](#).

## **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.

## SUPPORT SERVICES

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