# Critical Infrastructures

## Course Information

**Instructor:** Saman Zonouz (szonouz6@gatech.edu)
**Course Prefix and Number:** CS 6267 A
**Term:** Fall 2026

## Course Description

A more networked world has emerged since the end of the Cold War. Political, military, social and economic conflict, cooperation, and well-being are increasingly affected by the pervasive presence and availability of dense and large-scale networks. We define infrastructures as large scale cyber-physical networks for creating and delivering energy, people, goods, services, and information. Some are deemed so important that they have been designated Critical Infrastructures (CI). Among these are civil aviation, banking and finance, electric power, oil and gas, water and sewage, and communications infrastructures ranging from telephony to the Internet of Things. For vast numbers of people and organizations around the world, CIs operationally define modern civilization and globalization. "Resilience is the capacity of any entity … to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience."[Rodin,p.3] Security is resilience against disruptions caused by malicious actors. Most of the physical infrastructures have information infrastructures deeply embedded in them. Some have gotten to the stage where the physical infrastructures may be increasingly seen as being built around the information infrastructures. As such the vulnerabilities and insecurities that plague information infrastructures are inherited by the physical infrastructures. The course will thus necessarily include an overview of the landscape of cyber security. The class as a whole will start with the CI dimensions of the 9/11 attacks, arguably the most important national and international security event since World War II. The selection of additional case studies will depend on the size and interests of the class.

## Course Learning Outcomes

The primary learning objective of this class is to build content knowledge, developing a picture of both the 'trees and the forest' for specific areas of critical infrastructure. This includes:

- Defining and categorizing the different types of critical infrastructures that are embedded in and operationally define modern societies
- Identifying weaknesses in CI, including those vulnerabilities and access points that malicious actors could exploit

- Look to the resilience of CI beyond concerns of security, including other forms of protection and assurance: safety, survivability, sustainability, reliability, response, renewal, robustness, and recovery
- Describing connection points and dependencies linking different critical infrastructures
- Assessing the degree to which groups of critical infrastructures operate as networks, with the attendant strengths, weaknesses and uncertainties inherent in complex dynamic systems.

Our class will give emphasis to operating in a challenging and less certain context than you are used to. This will include a form of "flipping" where the students will take ownership of a substantial part of the content and conduct of the class. Much of this will take the form of the written and oral delivery of student projects. Working under that uncertainty is an important part of stretching you in all of the ways listed above.

## Required Course Materials

No textbooks or materials are required. Resources for research are determined in consultation with the thesis advisor.

## Grading Policy

Grading will be based on a combination of individual and group assignments. The breakdown is as follows:

10% Class participation, active discussions, essays (important).
35% Term projects (student teams) including the presentation.
35% Assignments.
20% Midterm exam (late in November). Based on all the material presented in class – e.g., term project presentations, research papers and visiting speaker presentations.

**Graduate students** will have additional research-oriented questions.
Reminder: Georgia Tech operates on an honor system.

**Grading Policy:**
Grades will be based on a point total computed as the following gradelines:

A [90, 100] - inclusive bracket;
B [80, 90) - exclusive parenthesis;
C [70, 80);
D [60, 70);
F [0, 60)

## Attendance Policy

Class attendance is mandatory, and past experience have shown that students who are actively involved in class discussions have the best experience conquering this challenging subject matter. Course deadlines and assignments can be modified for students with documented absences. These accommodations must be arranged in advance and in accordance with the Georgia Tech Attendance Policy.

## Academic and Research Honesty/Integrity Statement

Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. Review the Student Code of Conduct and the Academic Honor Code, especially Appendix A: Graduate Addendum to the Academic Honor Code.

Students are expected to perform research in an ethical and responsible manner. All Doctoral and Master's Thesis students are required to take the Responsible Conduct of Research training, and it is expected that students abide by the principles taught in that training while performing research for this thesis course.

Allegations of scientific or scholarly misconduct are handled in accordance with the procedures outlined by the Policy for Responding to Allegations of Scientific or Other Scholarly Misconduct.

## Core IMPACTS

Not applicable.

## Accommodations for Students with Disabilities

If you are a student with learning needs that require special accommodation, contact the Office of Disability Services as soon as possible to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

## Expectations of Advisors and Advisees

At Georgia Tech, we believe that it is important to strive for an atmosphere of mutual respect, acknowledgement, and responsibility between faculty members and the student body. The Expectations of Advisors and Advisees articulates some basic expectations that you can have of me and that I have of you. In the end, simple respect for knowledge, hard work, and cordial

interactions will help build the environment we seek. Therefore, I encourage you to remain committed to the ideals of Georgia Tech while in this class.