

USCViterbi

**CSCI631 Privacy in the World of Big Data**

**Units: 4**

**Fall 2021**

**Time:** Thursdays, 2-5:20pm

**Location:** [CPA](#) 200

**URL:** <https://www.korolova.com/teaching/CSCI631>

**Instructor: Aleksandra Korolova**

**Office:** SAL 206

**Office Hours:** TBA and by appointment

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## Course Description

A graduate level introduction to the privacy challenges that arise due to ubiquitous use of technology and low costs of data collection, storage, and analysis. An overview of algorithmic and technological approaches to addressing them.

The first half of the course will focus on statistical data privacy – the problem of making useful inferences based on data of many individuals while ensuring that each individual’s privacy is preserved. We will survey plausible-sounding approaches that fail to achieve this goal, followed by a study of privacy definitions and algorithms for achieving both privacy and utility (including in real-world applications such as publishing search logs and location traces, building recommender systems and telemetry for malware detection).

The second half of the course will survey the technical aspects of topics and technologies at the frontier of current privacy-related discourse, such as web (and other forms of) tracking and its unintended consequences and new models for data access such as federated learning.

Our aim is to explore cutting-edge research topics in privacy, with a balance between theory and practical applications.

The course is geared toward Ph.D. students who want to gain familiarity with privacy from a scientific perspective.

## Learning Objectives

This course aims to introduce students to the topics and techniques at the forefront of modern privacy research, thereby contributing to students’ ability for advancing the state-of-the-art in the field or addressing privacy-related challenges in their own research. By the end of the course, the students should be able to think critically about the privacy risks posed by collection, analysis or publication of data in various contexts, as well as be able to propose approaches to mitigating those risks.

## **Prerequisite(s): solid grasp of advanced algorithms, proof-based mathematics, and basic probability**

## Required Readings and Supplementary Materials

Links to PDF versions of all required readings will be posted on the class website.

## Description and Assessment of Assignments

### Reading assignments, problem sets, and responses to prompts.

Students will be expected to read and think deeply about papers selected by the instructor and complete assignments related to the material discussed in class or in the papers on a weekly basis. The goal of assignments is to deepen the knowledge of the topic presented in class, and to practice thinking critically and constructively about privacy research.

It is permissible to discuss the readings and assignments with fellow students, and to use other resources, but all write-ups should be done independently and should acknowledge all discussions and resources used.

### Research Paper Presentation.

Students will be expected to co-lead a class discussion based on an instructor-chosen research paper describing SoA privacy techniques.

### **Course Project.**

A major part of the course assignments is a research project, to be done in groups of 2-3 students, that should address a problem related to privacy. This may include:

- Discovery and analysis of a new privacy vulnerability in a recently published dataset, app, or widely used system.
- A design of a protocol, algorithm, or system that improves prior work.
- An implementation or extension of a recently published work or system demonstrating previously unknown aspects of it.

Projects can be tailored to be more theoretical and more applied depending on student background and interests, and may be in any area of privacy, including those not directly covered in the course. The instructor will be available to help formulate project ideas and give feedback and suggestions on project direction throughout the semester.

You will give a project presentation during the last week of classes and submit a conference-style report during the final exam period.

### **Grading Breakdown**

<b>Assignment</b>	<b>% of Grade</b>
Weekly assignments	30.0%
Class participation (including presentation)	25.0%
Course project (proposal)	15.0%
Course project (progress report)	7.5%
Course project (presentation)	7.5%
Course project (final report)	15.0%

### **Additional Policies**

You are allowed a total of 4 late days per semester that can be used for weekly assignment or course project proposal, progress report or final report.

**Tentative Course Schedule: See Webpage**

## Statement on Academic Conduct and Support Systems

### Academic Conduct

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Section 11, *Behavior Violating University Standards* <https://scampus.usc.edu/1100-behavior-violating-university-standards-and-appropriate-sanctions/>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct/>.

Discrimination, sexual assault, and harassment are not tolerated by the university. You are encouraged to report any incidents to the *Office of Equity and Diversity* <http://equity.usc.edu/> or to the *Department of Public Safety* <http://capsnet.usc.edu/department/department-public-safety/online-forms/contact-us>. This is important for the safety whole USC community. Another member of the university community – such as a friend, classmate, advisor, or faculty member – can help initiate the report, or can initiate the report on behalf of another person. *The Center for Women and Men* <http://www.usc.edu/student-affairs/cwm/> provides 24/7 confidential support, and the sexual assault resource center webpage [sarc@usc.edu](mailto:sarc@usc.edu) describes reporting options and other resources.

### Support Systems

A number of USC’s schools provide support for students who need help with scholarly writing. Check with your advisor or program staff to find out more. Students whose primary language is not English should check with the *American Language Institute* <http://dornsife.usc.edu/ali>, which sponsors courses and workshops specifically for international graduate students. *The Office of Disability Services and Programs* [http://sait.usc.edu/academicsupport/centerprograms/dsp/home\\_index.html](http://sait.usc.edu/academicsupport/centerprograms/dsp/home_index.html) provides certification for students with disabilities and helps arrange the relevant accommodations. If an officially declared emergency makes travel to campus infeasible, *USC Emergency Information* <http://emergency.usc.edu/> will provide safety and other updates, including ways in which instruction will be continued by means of blackboard, teleconferencing, and other technology.