

FRANCESCA FALZON

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[My Website](#)

EDUCATION

University of Chicago

Ph.D. Computer Science

- Advisors: Roberto Tamassia and Janos Simon

Chicago, IL, USA

September 2020 - June 2023 (Expected)

University of Chicago

M.S. Computer Science, GPA: 3.884 / 4.0

- Thesis: "Full Database Reconstruction in Two Dimensions"
- Advisor: David Cash

Chicago, IL, USA

October 2018 - August 2020

Rutgers University

B.A. Mathematics, GPA: 3.903 / 4.0

- Summa Cum Laude, Phi Beta Kappa.

New Brunswick, NJ, USA

September 2013 - May 2017

RESEARCH AND PROFESSIONAL EXPERIENCE

Brown University

Visiting Research Fellow

- Working on encrypted databases under the guidance of Prof. Roberto Tamassia.
- Designing schemes that support multi-dimensional range queries with a sliding scale of trade-offs with respect to security, storage overhead, and bandwidth.

Providence, RI, USA

October 2021 to Present

ETH Zürich

Visiting Student

- Designed and analyzed leakage-abuse attacks on encrypted graph database schemes that support shortest path queries under the guidance of Prof. Kenneth Paterson.

Zürich, Switzerland

June 2021 to September 2021

University of Chicago

Graduate Research Assistant

- Designed and deployed a number of database reconstruction attacks from the leakage of range queries over multi-attribute encrypted data. These attacks include both full and approximate database reconstruction; the results can be found [here](#). and [here](#).
- Developed new dynamic encrypted multi-map (EMM) schemes that hide the number of records returned upon each query.

Chicago, IL, USA

October 2018 to May 2021

Rutgers University

Undergraduate Research Assistant

- Studied collections of sets and their graph representations utilizing tools from combinatorics.
- Formalized the notion of a region graph with the goal of developing scalable, interactive graph-exploration tools.

New Brunswick, NJ, USA

September 2017 to October 2018

Lehman College CUNY

REU Participant

- Sought an efficient algorithm for finding the closure of a given set of rooted triples.
- Chosen through a competitive selection process and awarded a stipend of \$5000. Supported by the NSF.

New York, NY, USA

September 2016 to October 2017

PUBLICATIONS AND PREPRINTS

- **Francesca Falzon**, Kenneth G. Paterson. An Efficient Query Recovery Attack Against a Graph Encryption Scheme from ASIA CCS 2021 (Under Review, manuscript available upon request).
- **Francesca Falzon**^{*}, Evangelia Anna Markatou^{*}, Zachary Espiritu, Roberto Tamassia. Encrypted Range Search in Multiple Dimensions [PDF].
- Evangelia Anna Markatou^{*}, **Francesca Falzon**^{*}, William Schor, Roberto Tamassia. Reconstructing with Less: Leakage Abuse Attacks in Two-Dimensions. In *Proceedings of the ACM SIGSAC Conference on Computer and Communications Security*. Virtual, South Korea, November 2021. [PDF]
- **Francesca Falzon**^{*}, Evangelia Anna Markatou^{*}, Akshima, David Cash, Adam Rivkin, Jesse Stern, Roberto Tamassia. Full Database Reconstruction Attack in Two-Dimensions. In *Proceedings of the ACM SIGSAC Conference on Computer and Communications Security*. Virtual, USA, November 2020. [PDF] This conference publication combines and extends [this](#) and [this](#).

INVITED TALKS AND PRESENTATIONS

- *Full Database Reconstruction in Two-Dimensions (Invited talk)*. Microsoft Research Redmond Cryptography Colloquium. Virtual, USA. November 24, 2020.
- *Multi-dimensional database reconstruction (Poster talk)*. 7th Midwest Security Workshop. Chicago, IL. April 2019.
- *On the Complexity of the Rooted Triples Problem (Oral talk)*. Special Session on Mathematical Phylogenetics, American Mathematical Society Sectional Meeting. New York, NY. May 2017.

^{*} Indicates that authors contributed equally and are listed in alphabetical or reverse-alphabetical order, respectively.

TA EXPERIENCE

- MPCS Algorithms, University of Chicago. Spring 2021.
- MPCS Foundations of Computational Data Analysis, University of Chicago. Winter 2021.
- MPCS Discrete Math, University of Chicago. Autumn 2020.
- MPCS Algorithms, University of Chicago. Spring 2020.
- Cryptography, University of Chicago. Autumn 2019.
- MPCS Mathematics for Computer Science and Data Analysis, University of Chicago. Winter 2019.
- Cryptography, University of Chicago. Autumn 2018.
- Discrete Mathematics High School Summer Camp, Rutgers University. Summer 2018.
- Learning Strategies & GRE Prep Academic Coach, Rutgers University. Spring 2018.
- Introduction to Proofs, Rutgers University. Spring 2017.
- Calculus II, Rutgers University. Spring 2016.

AWARDS

- Think Swiss Research Scholarship (CHF 4800). 2020.
- Armed Forces Communications and Electronics Association Ralph W. Shrader Diversity Scholarship (\$3000). 2019.
- Rutgers University School of Arts and Sciences Excellence Scholarship (\$1000). 2016.

VOLUNTEER AND OUTREACH

- ETH Zurich CS PhD Paint Night Social, (*Organizer*). November 2021.
- UChicago CS Ph.D. Student Social Events, (*Student Minister*). 2019 to 2020.
- UChicago CS Ph.D. Student Tea-time, (*Co-founder, Student Minister*). 2018 to 2019.
- CompilerHer @ UChicago: Middle School Student Outreach, (*Teacher for Computer Security Course*). April 2019.
- New Jersey Office of Homeland Security, (*Cybersecurity Analysis Intern*). January 2019 to April 2018.
- Princeton Splash: High School Student Outreach, (*Teacher for Cryptography, Intro to Mathematical Logic*). April 2018, April 2017.
- Rutgers Women in the Mathematical Sciences Club, (*Co-founder, President*). 2016 to 2017.
- Rutgers International Student Orientation, (*Volunteer Organizer*). 2015 to 2016.
- Trim Magazine: Rutgers' Student-run Fashion and Lifestyle Magazine, (*Creative Director, Editor*). 2015 to 2016.
- Permanent Mission of Malta to the United Nations, (*Advisory Intern*). 2015.

SKILLS

Technical Skills Python (Libraries: NetworkX, Matplotlib)
Survey Skills Qualtrics
Spoken Languages English (Native), Maltese (Native), Italian (B1)