

# Lina Fajardo Gómez

Research interests: mathematical biology, graph theory, algebraic topology.

## EDUCATION

**University of South Florida.** Tampa, FL.

Doctor of Philosophy in Mathematics

*Methods in Discrete Mathematics to Study DNA Rearrangement Processes*

Master of Science in Biomedical Engineering

*Impedance Measurements as a Means to Improve the Biological Response of Gene Electrotransfer*

**Universidad de los Andes.** Bogotá, Colombia

Bachelor of Science in Mathematics

*Planar Algebras and Fusion Categories*

## PROGRAMMING

Languages and IDEs

- Python
  - matplotlib,
  - numpy,
  - networkx,
  - pandas,
  - sklearn,
- MATLAB,
- javascript,
- $\text{\LaTeX}$

Learning Platforms, Learning Systems, Applications

- Canvas
- MyLab
- WebAssign
- Gradescope
- Geogebra

## GitHub

Public repositories available at [github.com/fajardogomez](https://github.com/fajardogomez)

- [dowgraphs](#): has scripts to create and plot graphs based on word reduction rules, build a cell complex on them, and compute homology groups.
- [USFDissertationTemplate](#):  $\text{\LaTeX}$  template to meet USF's dissertation requirements, made available for other graduate students.

## AWARDS

First Place at the USF Genomics Codeathon (team lead)	2023
<i>Repurposing Drugs using Genomics and 3D Protein Structure Data</i>	
<ul style="list-style-type: none"><li>• coordinated tasks for a multidisciplinary team</li><li>• prepared project pitch and progress update presentations</li></ul>	
Third place from the USF Genomics Codeathon	2022
<i>DiseaseMap: An Exploratory Tool to Discover Relationships Between Rare and Common Diseases</i>	
<ul style="list-style-type: none"><li>• extracted and processed data from gene ontology databases</li><li>• designed a metric to measure disease similarity</li></ul>	
Tharp Endowed Award from the College of Arts and Sciences	2020, 2021, 2022
Tutor Excellence Award from INTO USF	2017

## RESEARCH

**University of South Florida.** Tampa, FL.

*Biomathematics Research Group led by Dr. Nataša Jonoska and Dr. Masahico Saito:*

Discrete and Topological Models for DNA Assembly 2017-22

*Biomedical Engineering Research Group led by Dr. Mark Jaroszeski:*

Electricity-Facilitated Gene Transfer Mechanisms 2013-14

## PUBLICATIONS

### Publications in Progress

*Betti Numbers of Prodsimplicial Complexes for Directed Graphs with Applications to Word Reductions*

Joint work with: Margherita Maria Ferrari, Nataša Jonoska, Masahico Saito

Manuscript on arXiv: <https://arxiv.org/abs/2305.05818>,

Github repository: <https://github.com/fajardogomez/dowgraphs>

*Betti Numbers for Word Graphs for Comparison of Scrambled Genomes in Ciliates*

Joint work with: Margherita Maria Ferrari, Nataša Jonoska, Masahico Saito

*Cryptic Pointers Predicting DNA Circularization*

Joint work with: Nataša Jonoska, Masahico Saito

*k-gene Legal Strings for Gene Segment Arrangements*

Joint work with: Devon Conant, Margherita Maria Ferrari, Nataša Jonoska, Masahico Saito

## TEACHING

### Instructor

#### University of South Florida. Tampa, FL.

College Algebra, Calculus I, Differential Equations	Spring 2024
Calculus I, Engineering Calculus III,	Fall 2023
Calculus I, Engineering Calculus II	Spring 2023
Calculus I, Engineering Calculus I, Business Calculus	Fall 2022
Precalculus	Fall 2021
College Algebra	Fall 2020
College Algebra	Fall 2019

#### Hillsborough Community College. Brandon, FL.

Beginning Algebra	Fall 2016
Beginning Algebra	Fall 2015

### Teaching Assistant

#### University of South Florida. Tampa, FL.

Engineering Calculus III	Fall 2020
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#### Universidad de los Andes. Bogotá, Colombia

Linear Algebra	Spring 2012
Integral Calculus	Spring 2011

### Tutor

#### University of South Florida. Tampa, FL.

Mathematics	2017-21
Mathematics and Biomedical Engineering (INTO USF)	2015-17

#### Universidad de los Andes. Bogotá, Colombia

Mathematics	2010-12
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### Grader

#### University of South Florida. Tampa, FL.

Graph Theory	Spring 2021
Topology, Engineering Calculus I	Spring 2019
Business Calculus	Fall 2018, Fall 2017

**Universidad de los Andes.** Bogotá, Colombia

Vector Calculus	Fall 2011
Complex Variable Calculus	Spring 2010
Linear Algebra	Fall 2009

## MENTORING

**University of South Florida.** Tampa, FL.

Raul Castillo	2023
<i>Integration Techniques</i> (jupyter notebook)	
Devon Conant	2020-21
<i>Strings Modeling Gene Segment Arrangements.</i>	
Project presented at the Undergraduate Research Symposium.	
Olta Tarko	2020
<i>Surge Functions and Drug Interactions.</i> This project has been <a href="#">published</a>	

## PRESENTATIONS

### Invited Talks

<b>Joint Mathematics Meeting</b>	04/2022
Special Session on Mathematical Models for Biomolecular and Cellular Interactions	
<i>Directed Prodsimplicial Complexes Related to DNA Rearrangement</i>	
Special Session on Women in Mathematical Biology	
<i>DNA Segment Arrangements and Delannoy Numbers</i>	

### Conferences

MAA Florida Sectional Meeting. Online.	02/2022
<i>Prodsimplicial Homology for Directed Graphs</i>	
Geometry and Topology meet Data Analysis and Machine Learning. Online.	07/2021
<i>Prodsimplicial Complexes on Directed Graphs related to DNA Rearrangement</i>	
Graduate Student Combinatorics Conference. University of Minnesota (online).	04/2021
Southeastern International Conference on Combinatorics, Graph Theory and Computing. Florida Atlantic University (online).	03/2021
<i>Prodsimplicial and <math>p</math>-Path Complexes in Directed Graphs</i>	
Florida Women in Mathematics Day. Florida Atlantic University.	02/2020
MAA Florida Sectional Meeting. Polk State College.	02/2019
<i>Product-simplicial Complexes in a Word Graph</i>	

## Seminar Talks

### University of South Florida

<i>Introduction to Matroids</i>	07/2020
Graduate Student Seminar	
<i>Product-simplicial Complexes on a Word Graph</i>	11/2019
Discrete Math Seminar	
<i>Geometric Group Theory: A Mathematical Melting Pot</i>	07/2019
Graduate Student Seminar	
<i>Homology: A Small Introduction to a Big Topic</i>	02/2019
Math Club	

## Poster Presentations

### University of South Florida

<i>Topological Measures of DNA Scrambling</i>	
Discrete and Topological Models in Molecular Biology	05/2022
University of South Florida Graduate Student Symposium	03/2022
<i>Product-Simplicial Complexes on a Word Graph</i>	2019
University of South Florida Graduate Student Symposium	

## EVENTS ATTENDED

### Conferences and Workshops

#### Banff International Research Station

<i>The Crossroads of Topology, Combinatorics and Biosciences: Deciphering the Entanglement of Multi-Stranded Nucleic Acids.</i>	03/2024
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#### Georgia Tech

<i>Southeast Center for Mathematics and Biology (SCMB) Annual Symposium</i>	02/2020, 01/2019
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#### University of Florida

<i>AMS Fall Southeastern Sectional Meeting</i>	11/2019
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#### Western Kentucky University

<i>33rd Summer Conference on Topology and its Applications</i>	07/2018
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#### University of Central Florida

<i>AMS Fall Sectional Meeting</i>	09/2017
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## Summer Schools

### Mathematical Sciences Research Institute

*Random and Arithmetic Structures in Topology* 06/2019  
(nominated by graduate committee and supported by MSRI)

### Universidad de los Andes

*Geometric, Algebraic and Topological Methods for Quantum Field Theory* 07/2011

## TRAVEL GRANTS

Association for Women in Mathematics Research Symposium. University of Minnesota 2022  
SCMB Annual Symposium. Georgia Tech 2020  
Florida Women in Mathematics Day. Florida Atlantic University 2019  
33rd Summer Conference on Topology and its Applications. Western Kentucky University 2018

## PROFESSIONAL SERVICE

### Conference and Workshop Organization

#### University of South Florida

Co-organizer of the 26th International Conference of Developments in Language Theory 05/2022  
Co-organizer of the Southeast Center for Mathematics and Biology (SCMB) Workshop on Discrete and Topological Models in Molecular Biology (DTMB) 05/2022  
President of AMS Graduate Student Chapter 2019-21  
Presentation - *Academic Conferences: A Soap-box Speech with Tips and Pointers* 11/2019  
Workshop - *TEX Workshop: Write Math the Pretty Professional Way* 2019-21

#### University of Minnesota

Special session co-organizer at the AWM Research Symposium 2022  
*Discrete and Topological Models for Biological Structures*

## PROFESSIONAL DEVELOPMENT

Academy for Teaching and Learning Excellence Workshops 2020  
*Should Learning Be Easy? Effortful Learning = Retained Learning*  
*What's Your Policy?*  
*Avoid Saying the Wrong Thing to Students: Maximize Learning by Minimizing Your Assumptions*  
*Your Memory Sucks*  
*Practices That Enhance Cultural Competency in College Teaching*  
*The Evaluation of Your Teaching is Too Important to Be Left to Others*

College Reading & Learning Association (CRLA) Tutor Training

2015-17

*Level 1: training in theory and tutoring strategies for individual and group peer tutoring*

*Level 2: delves into the psychological and philosophical underpinnings of tutoring*

*Level 3: develop introductory management techniques and present a research project*

## **LANGUAGES**

Spanish (native), English (fluent), French (intermediate), German (intermediate)