

# Curriculum Vitae

## Megan Fairchild

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### EDUCATION

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#### Doctor of Philosophy in Mathematics

Louisiana State University, Baton Rouge, Louisiana

Expected May 2025

#### Master of Science in Mathematics

Louisiana State University, Baton Rouge, Louisiana

May 2022

Texas State University, San Marcos, Texas

December 2018

*Thesis:* Using Knot Theory to Model and Analyze DNA Replication and Recombination.

#### Bachelor of Science in Mathematics *Cum Laude*

Texas State University, San Marcos, Texas

May 2016

*Minor:* Computer Science

### HONORS & AWARDS

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FELLOW: Research Training Groups (RTG)

2023-2024 & 2024-2025

Pasquale Porcelli Graduate Student Academic Excellence Award

2021

Texas State Three Minute Thesis (3MT) People's Choice

2018

"Math in the picture" contest winner

2017 & 2018

Academic Excellence, Department of Mathematics

2017 - 2018

Academic Achievement, Department of Mathematics

2014 - 2016

Dean's List

2012 - 2016

### TEACHING

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#### Graduate Instructional Assistant - Louisiana State University

Fall 2020 - current

INSTRUCTOR: Calculus I

LEAD TA: Business Calculus

#### Lecturer - Texas State University

Fall 2019 - Summer 2020

INSTRUCTOR: Contemporary Mathematics

INSTRUCTOR: Co-Requisite Intermediate and College Algebra

INSTRUCTOR: Co-Requisite Elementary Algebra and Contemporary Mathematics

#### Graduate Instructional Assistant - Texas State University

Spring 2017 - Fall 2018

INSTRUCTOR: Intermediate Algebra

TA: Calculus II, Pre-Calculus

#### Undergraduate Instructional Assistant

Fall 2014 & Fall 2015

TA: Pre-Calculus

#### Paper Grader

Spring 2016

Modern/Abstract Algebra, Introduction to Advanced Mathematics

#### Tutoring/ Math Tutoring Lab at Texas State

Fall 2014 - Fall 2017

Topology, Modern/Abstract Algebra, Differential Equations, Linear Algebra,

Calculus I, II, & III, Pre-Calculus, College Algebra

## PUBLICATIONS & PREPRINTS

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THE NON-ORIENTABLE 4 GENUS OF 11 CROSSING NON-ALTERNATING KNOTS. 2024  
*to appear in the Journal of Knot Theory and its Ramifications*  
*doi: 10.1142/S0218216524500500*

### Submitted for Publication:

NON-ORIENTABLE SURFACES IN KNOT TRACES 2024  
*Preprint: PDF available upon request*  
WHITEHEAD DOUBLES AND NON-ORIENTABLE SURFACES 2024  
*Preprint: arXiv:2410.13736*  
NON-ORIENTABLE 4 GENUS OF TORUS KNOTS 2024  
*Preprint: arXiv:2405.04737*

### Research Notes & Course Projects:

Brunnian Braids and Their Relation to Homotopy Groups of Spheres. 2022  
Using Knot Theory to Model and Analyze DNA Replication and Recombination. 2018  
The Betti Numbers of the Data Set of the Work of Bob Ross. 2018  
Analyzing Betti Numbers of Range Image Patches. 2018  
Analyzing Betti Numbers of the Zodiac Constellations. 2018  
The History of the Alexander Horned Sphere. 2017  
The History of  $i$ , the Imaginary Number. 2017  
The Eccentricity of Directed Graphs. 2012

## PROFESSIONAL SERVICE

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### SUPERVISOR OF UNDERGRADUATE RESEARCH:

Led vertically integrated research course Fall 2022-Current  
Topological Data Analysis  
(1, 1)-Knots and Heegaard Floer Homology  
Non-Orientable 4 Genus of Torus Knots  
Braids and Configuration Space  
Oversaw research via directed reading Spring 2024-current  
Seifert Surfaces and the Knot Signature  
Homological Algebra  
3-Manifolds and Heegaard Diagrams  
Introduction to Knot Floer Homology

### CURRICULUM DEVELOPMENT:

Co-Coordinator of Contemporary Mathematics, Texas State University Spring 2020  
Re-structured syllabus, created course material currently being used

### OFFICER:

Mathematics Student Colloquium Committee Fall 2022 - current

### ORGANIZER:

Informal Geometry & Topology Seminar, Louisiana State University Summer 2024-current  
Grad Students in 4D, Louisiana State University Spring 2023-current

### MENTAL HEALTH ALLY:

GEAUX Math LSU (new graduate student orientation) Fall 2021-current  
On the list of 'people to talk to' since Fall 2021, panelist for surviving graduate school  
Certified Ally at Texas State University Fall 2019

## WEBSITE DEVELOPMENT:

General Exam Preparation

Summer 2024

Created a website to help younger graduate students prepare for their general exam

## COLLOQUIA, CONFERENCE, & SEMINAR TALKS

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### *Invited Talks:*

Joint Mathematics Meetings at Seattle, WA	2025
<i>Non-Orientable Surfaces in Knot Traces.</i>	
AMS Sectional Meeting at the University of Kansas	2025
<i>Non-Orientable Surfaces in Knot Traces.</i>	
University of Nevada Reno Math Colloquium	2024
<i>The Non-Orientable 4 Genus of 11-Crossing Non-Alternating Knots.</i>	
Texas State University Topology Seminar	2024
<i>Non-Orientable Surfaces Bounded by Knots.</i>	
AMS Sectional at University at Albany	2024
<i>Non-Orientable Surfaces Bounded by Knots &amp; the Knot Trace.</i>	
Topology Students Workshop at Vanderbilt	2024
<i>The Non-Orientable 4 Genus of Knots.</i>	
Topology Conference at University of Georgia	2024
<i>Non-Orientable Surfaces in Knot Traces.</i>	
AMS Sectional at Florida State University	2024
<i>The Non-Orientable 4 Genus of Knots.</i>	
Geometry & Topology Seminar (LSU)	2024
<i>The Non-Orientable 4 Genus of 11-Crossing Non-Alternating Knots.</i>	
Kansas State Student's Topology Seminar	2024
<i>Whitehead Doubles &amp; Non-Orientable Surfaces.</i>	

### *Informal Topology Seminar & Other Research Presentations:*

Slicing Obstructions from 4-Manifold Theory	2024
Algebraic Knot Concordance Group	2024
The Double Branched Cover and its Relation to Non-Orientable 4 Genus.	2024
The Non-Orientable 4 Genus of Torus Knots.	2024
The Non-Orientable 4 Genus of Knots.	2023
Smooth versus Topological Concordance via Whitehead Doubles.	2023
Brunnian Braids and Their Relation to Homotopy Groups of Spheres.	2022
Legendrian Knots & DGA.	2021
Modeling DNA Replication and Recombination with Knot Theory.	2018
Analyzing Betti Numbers of Range Image Packages.	2018
The History of Imaginary and Complex Numbers.	2017
The History of the Alexander Horned Sphere.	2017
Heroes of Homology.	2017

## CONFERENCES ATTENDED

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AMS Sectional - University of Kansas	March 2025
Nebraska Conference for Undergraduate Women in Mathematics	January 2025
Joint Mathematics Meetings - Seattle, WA	January 2025
AMS Sectional - University at Albany	October 2024
ICERM Braids Reunion Workshop - Brown University	July 2024

Topology Students Workshop - Vanderbilt University	June 2024
Topology Summer School & Conference - University of Georgia	May 2024
AMS Sectional - Florida State University	March 2024
Texas Geometry and Topology - Rice University	November 2023
SEC Topology - University of Alabama	June 2023
Topology Conference - University of Georgia	May 2023

## LANGUAGES

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Spanish	<i>Intermediate Speaker</i>
Coding: C++, JavaScript, Python, MatLab, HTML, L <sup>A</sup> T <sub>E</sub> X	

## MEMBERSHIPS

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American Mathematical Society	current
Math Club, Texas State University	2012- 2018
Pi Mu Epsilon, Texas State University	2016 - 2018
National Society of Collegiate Scholars	2013 - 2018