

# 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, LA

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)

2024-2025

FELLOW: Research Training Groups (RTG)

2023-2024

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

### PUBLICATIONS & PREPRINTS

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#### Submitted for Publication:

THE NON-ORIENTABLE 4 GENUS OF 11 CROSSING NON-ALTERNATING KNOTS.

2024

*Preprint:* arXiv:2403.00996

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

### 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-Enroll Intermediate and College Algebra

INSTRUCTOR: Co-Enroll 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 &amp; Fall 2015

TA: Pre-Calculus

**Paper Grader**

Spring 2016

Modern/Abstract Algebra, Introduction to Advanced Mathematics

**Private Tutoring/ Math Tutoring Lab at Texas State**

Fall 2014 - Fall 2017

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

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

**COLLOQUIA, CONFERENCE, & SEMINAR TALKS***Invited Talks:*

Joint Mathematics Meetings at Seattle, WA 2025

*Non-Orientable Surfaces in Knot Traces*

University of Nevada Reno Math Colloquium 2024

*The Non-Orientable 4 Genus of 11-Crossing Non-Alternating Knots.*

Texas State University Topology Seminar 2024

*Non-Orientable Surfaces Bounded by Knots & the Knot Trace*

AMS Sectional at University at Albany 2024

*Non-Orientable Surfaces Bounded by Knots & the Knot Trace*

Topology Students Workshop at Vanderbilt 2024

*The Non-Orientable 4 Genus of Knots.*

Topology Conference at University of Georgia 2024

*Non-Orientable Surfaces in Knot Traces.*

AMS Sectional at Florida State University 2024

*The Non-Orientable 4 Genus of Knots.*

Geometry &amp; Topology Seminar (LSU) 2024

*The Non-Orientable 4 Genus of 11-Crossing Non-Alternating Knots.**Informal Topology Seminar & Other Research Presentations:*

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 &amp; 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

## PROFESSIONAL SERVICE

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### MENTOR FOR 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	
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
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### 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	

## CONFERENCES ATTENDED

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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++, Python, MatLab, HTML, $\text{\LaTeX}$	

## 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