

Mason Springfield
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EDUCATION

- **Doctor of Philosophy, Mathematics**, Texas Tech University, Lubbock, Texas, May 2025
 - Dissertation: *The number of transitive subtournaments of k -th power Paley digraphs and improved lower bounds for Ramsey numbers.*

Advisor: Dr. Dermot McCarthy

- Preliminary Exam Fields: Algebra, Real Analysis, Complex Analysis
- **Bachelor of Science, Mathematics**, Texas Tech University, Lubbock, Texas, May 2020
 - Summa Cum Laude
 - Minor: Computer Science

TEACHING EXPERIENCE

- Fall 2023; TTU Calculus II with Applications (Online, Instructor of Record)
- Spring 2023; TTU Higher Mathematics for Engineers and Scientists I (In-Person, Instructor of Record)
- Fall 2022; TTU Calculus I with Applications (In-Person, Instructor of Record)
- Spring 2022; TTU Introductory Mathematical Analysis II (In-Person, Instructor of Record)
- Fall 2021; TTU Introductory Mathematical Analysis II (In-Person, Instructor of Record)

TEACHING INTERESTS

- As a mathematics instructor I have greatly enjoyed teaching sections of calculus, both for STEM focused degree paths and for Business students. I feel it is in calculus that mathematics truly comes into its own as a distinguished discipline, and it is fun to be the one to introduce my students to the concepts. As an extension of this, I also greatly enjoyed teaching differential equations, especially as it is one of the opportunities to show students the interplay between calculus and algebra.

TEACHING PHILOSOPHY

- As a math educator, it is my belief that we should strive to make our students comfortable, confident, proficient problem solvers and communicators. To meet this end, I believe that collaboration and discussion between peers, and with the instructor, is crucial to maximizing a student's potential. By encouraging group work, where appropriate, and discussion both in person and online, I hope to be able to help students achieve their desired math ambition.

HONORS / AWARDS

- TTU Doctoral Dissertation Completion Fellowship: Fall 2024 – Spring 2025

- TTU DGSA Recipient: Fall 2020 – Spring 2024
- TTU President's List: Spring 2017 – Spring 2019
- TTU Dean's List: Fall 2017

RESEARCH EXPERIENCE

- Two publications with Dr. Dermot McCarthy at Texas Tech University in graph theory. These publications focused on the area of Ramsey theory, using finite field hypergeometric functions to aid in some counting exercises. The outcome of these two papers were two-fold; a) improvements to the known lower bounds of both undirected and directed Ramsey numbers, b) improvements in the computability of finite field hypergeometric functions.
- A survey of the field of classical cryptography with Dr. Chris Monico. This survey was conducted in the summer of 2021 and acted as a foundation level introduction to the field and its related concepts.
- Undergraduate research on modeling solutions to differential equations under Dr. Lourdes Juan from fall 2018 to spring 2019. Focused on the learning and implementation of several modeling schemes in relation to problems in bio-mathematics and ecological stoichiometry.

PUBLICATIONS

- D. McCarthy, M. Springfield. "Transitive subtournaments of k-th power Paley digraphs and improved lower bounds for Ramsey numbers" *Graphs and Combinatorics*, 40:71 (2024), 21 pp.
- D. McCarthy, M. Springfield. "Orbits of Finite Field Hypergeometric Functions and Complete Subgraphs of Generalized Paley Graphs" *Involve*, 17-2 (2024), 355-362.

TECHNICAL SKILLS

- Programming Languages
 - C
 - C++
 - C#
 - Python
 - x86 Assembly
- Microsoft Office Suite
- Management of groups of people from 22 – 120
- Translation of complex, technical ideas into understandable, actionable tasks
- Collaboration on technical problems
- Ability to self lead projects