Karuna Sangam | PhD Candidate

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PhD candidate in mathematics with a passion for education.

Education

Rutgers University **New Brunswick, NJ**
PhD in Mathematics *2018–current*
Activities: Treasurer for AMS Graduate Chapter 2018-19.

Bard College **Annandale-on-Hudson, NY**
BA in Mathematics *2014–2018*
Activities: Student Government, Swim & Dive team.

Undergraduate thesis

Title:: *Homeomorphisms of the Sierpiński Carpet*

Advisor:: James Belk

Description:: In this project, I studied self-homeomorphisms of the Sierpiński carpet. In particular, I identified its finite subgroups and attempted to define a transducer homeomorphism of the carpet.

Experience

Teaching

Rutgers University **New Brunswick, NJ**
Graduate Teaching Assistant *2018–Current*
As tutor in the Math Help Center: Worked as a drop-in tutor at tutoring center, primarily working with students in 100- and 200-level courses, but occasionally helping with higher level material as well.
As TA for a course: Led recitation sections for various undergraduate courses, including single- and multi-variable calculus, linear algebra, and real analysis. Held weekly office hours for students to seek help. Graded student work. Have experience both online and in-person

Rutgers University **New Brunswick, NJ**
Instructor of Record *Summer 2020*
Served as instructor of record for Math 251 (multi-variable calculus) online. Conducted lectures and recitation sections, wrote quizzes and exams, held oral exams in order to gauge understanding of material in the online format.

Bard College **Annandale-on-Hudson, NY**
Math Tutor *2015–2017*
Monitored the math study room, which is a space available for students to study math on weeknights. Assisted students who requested help. Worked as the dedicated tutor for an Abstract Algebra class, offering weekly office hours as well as one-on-one tutoring sessions for students who requested it.

De Anza College **Cupertino, CA**
Math Tutor *Spring 2014*
Helped students in need of additional help in beginning algebra through precalculus. Tutored on both a weekly individual and a drop-in basis. Guided one-on-one students through areas of challenge.

Research

University of Connecticut **Storrs, CT**
Research Assistant *2017*
Supported by the NSF through their REU progrem. Conducted research on the existence and continuity of gradients on generalizations of the Sierpiński Gasket. Presented research in a talk at the Young Mathematicians Conference 2017 at Ohio State University.

Bard College **Annandale-on-Hudson, NY**
Research Assistant *2016*
Assisted in research on finding module bases for integer generalized splines. Presented research in a poster session at Summer Combo 2016 in Vermont, hosted by Saint Michael's College. Gave a brief talk at the Garden State Undergraduate Math Conference 2017, hosted by The College of New Jersey.

Miscellaneous

Bard College **Annandale-on-Hudson, NY**
Lifeguard and Swim Instructor *2015–2016*
Worked as a lifeguard and a swim instructor at the athletic center at Bard College.

Languages

English: Native fluency
French: Rudimentary
Tamil: Conversational fluency
Hungarian: Rudimentary

Skill matrix

■□□□□ basic knowledge
■■□□□ intermediate knowledge with some project experience
■■■□□ extensive project experience
■■■■□ deepened expert knowledge
■■■■■ expert / specialist

	Level	Skill	Years	Comment
Teaching:	■■■□□	Calculus I-III	3	*Have taught single variable and multivariable calculus at the college level as a TA and multivariable calculus once as Instructor of Record*
Teaching:	■■■□□	Linear Algebra	1	*Have worked as a TA for introductory linear algebra at the college level.*
Teaching:	■■■□□	Real Analysis	1	*Have worked as a TA for introductory real analysis at the undergraduate level.*
Tutoring:	■■■□□	Undergraduate	6	*Have worked as a math tutor at the college level in both a drop-in and individual capacity.*
Tutoring	■■■□□	High School	6	*Have tutored high school students in subjects from Algebra 1 through Precalculus.*

Language: ■■□□□	Python	4	*Have used both in SageMath and for personal projects*
Language: ■■□□□	SageMath	2	*Have used as part of mathematical research*
Language: ■■□□□	Mathematica	2	*Have used as part of mathematical research*
Language: ■■■□□	LaTeX	8	*Have experience making classes LaTeX*
Language: ■□□□□	Java	1	*Used in data structures course.*
Language: ■■□□□	HTML/CSS	2	*Basic web design experience.*
Language: ■□□□□	Javascript	1	*Small personal projects.*
OS: ■■□□□	Linux	2	*I use Ubuntu as my personal system*
Math: ■■■■■	Low-Dimensional Topology	2	*Current area of research is in knot theory, relying on invariants derived from Heegaard Floer and knot Floer homology.*
Math: ■■■■□	Algebraic Topology	3	*Covered in oral qualifying exams. Used extensively in research.*
Math: ■■■■□	Differential Geometry	3	*Covered in oral qualifying exams. Used extensivly in research.*
Math: ■■■■□	Functional Analysis	4	*Undergraduate and graduate coursework, familiar with operator algebras.*
Math: ■■■■□	Real Analysis	7	*Undergraduate and graduate coursework.*
Math: ■■■□□	Complex Analysis	3	*Graduate coursework.*
Math: ■■■□□	Abstract Algebra	7	*Undergraduate and graduate coursework.*
Math: ■■■□□	Dynamical Systems	3	*Have taken undergraduate coursework in dynamical systems and have worked on research involving fractals.*
Math: ■■□□□	Combinatorics	1	*Undergraduate coursework.*

Interests

Music: I enjoy composing and playing music in my spare time.

Knitting: I enjoy knitting on occasion as well.

Hiking/Camping: When the weather is nice, I like to spend time outside.

References

[1] Luke Brown, Giovanni Ferrer, Gamal Mograby, Luke G. Rogers, and Karuna Sangam. Harmonic gradients on higher-dimensional Sierpiński gaskets. *Fractals*, 28(06):2050108, Sep 2020.

[2] Karuna Sangam. Homeomorphisms of the Sierpiński carpet. Bachelor's thesis, Bard College, 2018.