

Kyle Flanagan

446 McBryde Hall
Blacksburg, VA 24061

flanaga5@vt.edu

Education

Virginia Tech <i>Ph.D. in Mathematics</i>	2020 – 2023
Purdue University <i>M.S. in Mathematics</i>	2016 – 2020
St. Mary's College of Maryland <i>B.A. in Mathematics, Minor in Physics</i>	2012 – 2016

Teaching Experience

Visiting Assistant Professor <i>Virginia Tech</i> <ul style="list-style-type: none">Math 2114 Intro to Linear Algebra (Spring 2024)	December, 2023 – Present
Graduate Teaching Assistant <i>Virginia Tech</i> <ul style="list-style-type: none">Math 3034 Intro to Proofs (Fall 2023)Math 1025 Elementary Calculus (Summer 2023)Math 2114 Intro to Linear Algebra (Fall 2022; Spring 2021)Math 1225 Calculus of a Single Variable I (Fall 2020,2021; Spring 2022)	August, 2020 – December, 2023
Graduate Teaching Assistant <i>Purdue University</i> <ul style="list-style-type: none">Math 16020 Applied Calculus II (Fall 2019; Spring 2019,2020)Math 26100 Multivariable Calculus (Summer 2019; <i>grading</i>)Math 16020 IMPACT Applied Calculus II (Fall 2018; <i>flipped classroom</i>)Math 16200 Plane Analytic Geometry and Calculus II (Summer 2018)Math 16200 Plane Analytic Geometry and Calculus II (Fall 2017; Spring 2018; <i>recitation</i>)	August, 2017 – May, 2020

Additional Work and Teaching Experience

Senior Graduate Teaching Assistant <i>Virginia Tech</i> <ul style="list-style-type: none">Contributed to the guidance and professional development of the graduate teaching assistants in Math Department, including designing and hosting biweekly seminars, organizing other events such as town halls, and developing a graduate student website.	August, 2021 – December, 2023
Math Education Seminar Organizer <i>Virginia Tech</i> <ul style="list-style-type: none">Helped organize and manage the Mathematics Education Seminar, including contacting presenters, managing the seminar calendar, and organizing social events.	August, 2022 – May, 2023
Course Development (GTA) <i>Virginia Tech</i> <ul style="list-style-type: none">Analyzed course materials for Math 1025 Elementary Calculus I, including the course's online textbook and homework problems. Provided detailed feedback and suggestions for what aspects of these materials needed to be kept, altered, and removed, which were organized into an ~ 80 page document.	January, 2022 – May, 2023

Course Development (GTA)

May, 2021 – August, 2021

Virginia Tech

- Contributed to the design and modification of the Math 1225 Calculus of a Single Variable I fill-in-the-blank lecture notes that are provided for use to all graduate teaching assistants for the course. These course notes were designed to help integrate regular group work into the Math 1225 curriculum.

Teaching Assistant

August, 2014 – May, 2016

St. Mary's College of Maryland

- Math 281 Foundations of Mathematics (Spring, 2016; *grading*)
- Freshmen seminar entitled Mind-Bending Math (Fall, 2015; *peer-mentorship*)
- Math 422 Abstract Algebra II (Spring, 2015; *grading*)
- Math 321 Abstract Algebra I (Fall, 2014; *grading*)

Data Analyst Intern

May, 2014 – August, 2014

NAVAIR Patuxent River

- Organized and analyzed large databases for different organizations at NAVAIR, including giving weekly presentations on data findings.

Research Publications

- J6 Norton, A., & Flanagan, K. (in review). What children teach us about the prime number theorem. To appear in *For the Learning of Mathematics*.
- J5 Hicks, M., & Flanagan, K. (in press). Analogical structure sense: A case study of students' analogical reasoning between groups and rings. To appear in *Journal of Mathematical Behavior*.
- J4 Flanagan, K. (2023). Why mathematicians 'fully understand' - An exploration of influences on their understanding. In S. Cook, B. Katz & D. Moore-Russo (Eds.), *Proceedings of the 25th Annual Conference on Research on Undergraduate Mathematics Education* (pp. 1104-1110). Omaha, NE.
- J3 Hicks, M., Flanagan, K., & Park, M. (2023). Explicating the role of abstraction during analogical concept creation. In S. Cook, B. Katz & D. Moore-Russo (Eds.), *Proceedings of the 25th Annual Conference on Research on Undergraduate Mathematics Education* (pp. 806-814). Omaha, NE.
- J2 Flanagan, K. (2022). Confronting abstraction: An analysis of mathematicians' concept images and definitions. In Karunakaran, S. S. & Higgins, A. (Eds.), *Proceedings of the 24th Annual Conference on Research on Undergraduate Mathematics Education* (pp. 177-184). Boston, MA.
- J1 Norton, A., & Flanagan, K. (2022). The prime number theorem as a mapping between two mathematical worlds. In Lischka, A. E., Dyer, E. B., Jones, R.S., Lovett, J. N., Strayer, J., & Drown, S. (Eds.), *Proceedings of the 44th Annual Meeting of the North American Chapter of the International Group for the Psychology of Mathematics Education* (pp. 920-928). Nashville, TN.

Additional Research Experience

Dissertation in Mathematics Education

Completed in December, 2023

Virginia Tech

- Research investigating how professional mathematicians understand and work with highly-abstract, advanced mathematical concepts, and what influences that understanding. More specifically, investigating how and when professional mathematicians use pseudo-objects in their own mathematical practices.

Analogies and Metaphors in Mathematics Education

April, 2023 – Present

Virginia Tech

- Research investigating how analogies and metaphors have been used in mathematics education literature, especially in undergraduate mathematics education, with a focus on identifying distinguishing elements of how these constructs are used in the literature. A conference proceedings and journal manuscript are in development – with Michael Hicks, Rachel Rupnow, and Matthew Park.

Structure Sense in Abstract Algebra

June, 2023 – Present

Virginia Tech

- Research investigating the structure sense of undergraduate students in abstract algebra, as it pertains to analogous concepts in group and ring theory, such as substructure, structure preserving maps, and quotient structures. A journal manuscript is in development – with Michael Hicks.

Thesis Research in Commutative Algebra

June, 2019 – May, 2020

Purdue University

- Early stages of previous dissertation research in commutative algebra. Research focused on the deformation of F -purity for complete local normal \mathbb{Q} -Gorenstein domains.

St. Mary's Project

August, 2015 – May, 2016

St. Mary's College of Maryland

- Senior research project focused on algebraic dynamics, specifically finding bounds on the number of preperiodic points of cubic rational functions. Results were written and submitted as an undergraduate thesis, as well as presented.

Combinatorial Game Theory

October, 2015 – December, 2015

St. Mary's College of Maryland

- Course research project that found winning strategies and positions for a two-pile variant of a subtraction game entitled D.U.D.E.N.E.Y. A final paper and presentation were constructed – with William Kimmel.

Mathematics Research Experience for Undergraduates

May, 2015 – July, 2015

The University of Texas at Tyler

- Completed a research project in chemical graph theory, focused on classifying extendability of collections of fullerene patches. A final paper, poster, and presentation were constructed – with Bethany Molokach and Rachel Olugbemi.

Knot Theory

March, 2014 – May, 2014

St. Mary's College of Maryland

- Course research project that extended quandle colorings to virtual knots, and studied the basic qualities of this coloring invariant. A final presentation was constructed – with Caroline VanBlargan.

Conference Presentations

1. Flanagan, K. (February, 2023). Why mathematicians 'fully understand' - An exploration of influences on their understanding. Presentation at the 25th Conference on Research in Undergraduate Mathematics Education, Omaha, NE.
2. Hicks, M, Flanagan, K., & Park, M. (February, 2023). Explicating the role of abstraction during analogical concept creation. Presentation at the 25th Conference on Research in Undergraduate Mathematics Education, Omaha, NE.
3. Flanagan, K. (November, 2022). Mathematicians' understanding - An argument for the value of pseudo-objects. Poster presentation at the 44th Conference on Psychology of Mathematics Education - North America, Nashville, TN.
4. Norton, A., & Flanagan, K. (November, 2022). The prime number theorem as a mapping between two mathematical worlds. Presentation at the 44th Conference on Psychology of Mathematics Education - North America, Nashville, TN.

5. Flanagan, K. (October, 2022). Influences on mathematicians' 'full understanding' - An overview and framework. Presentation at the 6th Northeastern Conference on Research in Undergraduate Mathematics Education. [virtual via Zoom]
6. Flanagan, K. (February, 2022). Confronting abstraction - An analysis of mathematicians' concept images and definitions. Presentation at the 24th Conference on Research in Undergraduate Mathematics Education, Boston, MA.
7. Flanagan, K. (April, 2016). Algebraic dynamics of a one-parameter family of cubic rational functions. Presentation at the Spring 2016 Meeting of the MD-DC-VA Section of the MAA, Germantown, MD.
8. Flanagan, K., Molokach, B., & Olugbemi, R. (January, 2016). Extending 5-spirals to fullerenes. Poster presentation at the Joint AMS-MAA Annual Meeting, Seattle, WA.
9. Flanagan, K. & Molokach, B. (October, 2015). Extending 5-spirals to fullerenes. Poster presentation at the MAA NC State Dinner, Elon, NC.

Non-Conference Presentations

1. Flanagan, K. (November, 2023). Professional mathematicians' level of understanding: An investigation of pseudo-objectification. Presentation at the Virginia Tech Mathematics Education Seminar, Blacksburg, VA.
2. Flanagan, K. (May, 2023). Mathematicians and pseudo-objects: Some preliminary findings. Presentation at the Virginia Tech Mathematics Education Seminar, Blacksburg, VA.
3. Hicks, M., Flanagan, K., & Park, M. (February, 2023). Explicating the role of abstraction during analogical concept creation. Presentation at the Virginia Tech Mathematics Education Seminar, Blacksburg, VA.
4. Flanagan, K. (February, 2023). Why mathematicians 'fully understand': An exploration of influences on their understanding. Presentation at the Virginia Tech Mathematics Education Seminar, Blacksburg, VA.
5. Norton, A., & Flanagan, K. (October, 2022). The prime number theorem as a mapping between two mathematical worlds. Presentation at the Virginia Tech Mathematics Education Seminar, Blacksburg, VA.
6. Flanagan, K. (September, 2022). Why mathematicians 'fully understand' - A theoretical framework. Presentation at the Virginia Tech Mathematics Education Seminar, Blacksburg, VA.
7. Flanagan, K. (February, 2022). Confronting abstraction: An analysis of mathematicians' concept images and definitions. Presentation at the Virginia Tech Mathematics Education Seminar, Blacksburg, VA.
8. Flanagan, K. (November, 2021). Building a framework - Understanding mathematicians and abstraction. Presentation at the Virginia Tech Mathematics Education Seminar, Blacksburg, VA.
9. Flanagan, K. (March, 2021). Exploring research ideas on mathematicians' thinking. Presentation at the Virginia Tech Mathematics Education Seminar, Blacksburg, VA. [virtual via Zoom]

10. Flanagan, K. (October, 2020). Introduction to combinatorial game theory. Presentation at the Virginia Tech Mathematics Education Seminar, Blacksburg, VA. [virtual via Zoom]
11. Flanagan, K. (September, 2018). Introduction to combinatorial game theory. Presentation at the Purdue University Mathematics Student Colloquium, West Lafayette, IN.
12. Flanagan, K. (October, 2015). Extending 5-spirals to fullerenes. Presentation at the St. Mary's College of Maryland SIAM Research Symposium, St. Mary's City, MD.

Additional Conference Attendance

1. 7th Northeastern Conference on Research in Undergraduate Mathematics Education, virtual via Zoom. (November, 2023).
2. Field of Dreams Conference, St. Louis, MO. (November, 2016, 2017, 2018, 2019).
Helped with student outreach and recruitment for the Purdue University Mathematics Department during the Graduate Fair.
3. Field of Dreams Conference, Birmingham, AL. (November, 2015).
Served as a panel member about experiences in REU programs for mathematics.
4. Meeting of the MD-DC-VA Section of the MAA, Salem/Hollins, VA. (April, 2015).
5. Regional Undergraduate Mathematics Research Conference, Towson, MD. (March, 2015).
6. Meeting of the MD-DC-VA Section of the MAA, Bowie, MD. (November, 2014).
7. Meeting of the MD-DC-VA Section of the MAA, Harrisonburg, VA. (April, 2014).
8. Joint AMS-MAA Annual Meeting, Baltimore, MD. (January, 2014).
9. Meeting of the MD-DC-VA Section of the MAA, Hampden Sydney/Farmville, VA. (November, 2013).

Awards & Recognitions

Outstanding Math GTA of the Year	
<i>Virginia Tech</i>	2023
Graduate Merit Fellowship	
<i>Virginia Tech</i>	<i>Fall 2020 – Spring 2022</i>
Department of Mathematics Outstanding Senior Award	
<i>St. Mary's College of Maryland</i>	2016
St. Mary's Scholar	
<i>St. Mary's College of Maryland</i>	2015 – 2016
Dean's List	
<i>St. Mary's College of Maryland</i>	2012 – 2015
William Lowell Putnam Competition	
<i>Ranked 623.5 out of 4320 students with a score of 22 points.</i>	2014
William Lowell Putnam Competition	
<i>Ranked 830 out of 4113 students with a score of 18 points.</i>	2013

Computer Skills

Programming Languages: L^AT_EX, Java, Python, MATLAB