RACHAEL ALVIR

University of Waterloo   Email: rae.alvir@gmail.com
Department of Pure Mathematics
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EDUCATION

University of Notre Dame
Ph.D. (2022)
Mathematics
255 Hurley Hall, Notre Dame, IN 46556, USA

St. John's College
B.A. (2015)
Majors: History of Math and Science, Philosophy
Minors: Classical Studies, Comparative Literature
1160 Camino de Cruz Blanca, Santa Fe, NM 87505, USA

DISSERTATION

Title: Scott Analysis of Countable Structures
Advisor: Julia F. Knight

PUBLICATIONS AND PREPRINTS

1. "Finitely α-generated Structures." *In Preparation.*

2. "Interpreting a Field in its Heisenberg Group." With W. Calvert, G. Goodman, V. Harizanov, J. Knight, A. Morozov, R. Miller, A. Soskova, R. Weisshaar, *Journal of Symbolic Logic*, vol. 87 (2022), no. 3, pp. 1215 - 1230.

3. "Copying One of a Pair of Structures." With H. Burchfield and J. Knight, *Journal of Symbolic Logic*, vol. 87 (2022), no. 3, pp. 1201-1214.

4. "Scott Complexity of Countable Structures." With N. Greenburg, M. Harrison-Trainor, and D. Turetsky. *Journal of Symbolic Logic*, vol. 86 (2021), no. 4, pp. 1706 - 1720.

5. "Scott Sentences of Scattered Linear Orders." With D. Rossegger. *Journal of Symbolic Logic*, vol. 85 (2021), no. 3, pp. 1079-1101.

6. "Complexity of Scott Sentences." With J. Knight and C. McCoy. *Fundamenta Mathematicae*, vol. 251 (2020), pp. 109-129.

7. "Perfect State Transfer in Laplacian Quantum Walk." With S. Dever, B Lovitz, J. Myer, C. Tamon, Y. Xu, H. Zhan. *Journal of Algebraic Combinatorics*, 43.4 (2016), pp. 801-826.

INVITED TALKS

1. Talk at the ASL North American Meeting at the University of of California Irvine, Irvine CA, "Scott Complexity and Groups," March 2023.

2. Talk in the Model Theory Seminar at McMaster University, Hamilton, Ontario CA, "Scott Complexity of Groups," March 2023.

3. Talk in Group Theory and Logic special session, Spring Central Sectional Meeting, West Lafayette IN, "Finitely α-generated Divisible Groups," March 2022.

4. Talk in the Penn State Logic Seminar at the Pennsylvania State University, University Park, PA, "Scott Complexity and Finitely α-generated Groups," February 2022.

5. Talk at the New England Recursion and Definability Seminar (NERDS) at Wellesley College, Wellesley, MA, "Scott Complexity and Finitely α-generated Structures," December 2021.

6. Talk in Midwest Computability Seminar at the University of Chicago, IL, "Scott Complexity and Finitely α-generated Structures," September 2021. (Online)

7. Talk in Online Logic Seminar at Southern Illinois University, IL, "Scott Complexity and Finitely α-generated Structures," June 2021. (Online)

8. Talk at South Eastern Logic Symposium (SEALS), Gainesville, FL, "Scott Complexity and Finitely α-generated structures," February 2020.

9. Talk at Midwest Computability Seminar XXIV, Chicago, IN, "Scott Sentences," February 2020.

10. Talk at the First Workshop on Digitalization and Computable Models (WDCM), Novosibirsk, Russia, "Scott Sentences: History and Motivation," December 2019.

11. Talk in Computability special session at the CMS Winter Meeting, Toronto, Canada, "Scott Complexity and Finitely α-generated structures," December 2019.

12. Talk in Logic session at Langenhop Lecture and SIU Pure Mathematics Conference, Carbondale, IL, "Scott Sentences of Scattered Linear Orders," May 2019.

13. Talk in Computability special session at the AMS spring eastern sectional meeting, Harford, CT "Scott Complexity and Finitely α-generated structures," April 2019.

14. Talk in Model Theory seminar at CUNY Graduate Center, New York, NY, "Scott Sentences of Scattered Linear Orders," April 2019.

15. Talk in Logic Across Disciplines seminar at George Washington University, Washington D.C., "Scott Sentences of Scattered Linear Orders," April 2018.

CONTRIBUTED TALKS

1. Talk in Computability special session at Logic Colloquium, Prague, Czech Republic, "Scott Complexity and Finitely α-generated Structures," August 2019.

2. Talk at the Informal Russian-American Workshop, Novosibirsk, Russia, 'Scott Complexity and Finitely α-generated Structures," July 2019.

3. Talk in Computability special session at South Eastern Logic Symposium (SEALS), Gainesville, FL, "Scott Sentences of Scattered Linear Orders," March 2018.

4. Talk at Graduate Student Logic Conference, Madison, WI, "Scott Sentences of Scattered Linear Orders" April 2018.

5. Talk at Graduate Student Logic Conference, Urbana-Champaign, IL "Scott Sentences of Scattered Linear Orders," April 2017.

6. Talk at Graduate Student Logic Conference, Notre Dame, IN "Optimal Scott Sentences," April 2016.

7. Talk in the AMS-MAA-SIAM Special Session on Research in Mathematics by Undergraduates and Students in Post-Baccalaureate Programs at the Joint Mathematics Meeting, San Antonio, TX "Quantum Walks on Graphs," January 2015

TEACHING AND TUTORING

At the University of Waterloo:

Winter 2022: PMATH 330, Introduction to Mathematical Logic (proof-based).
Fall 2022: MATH 228, Differential Equations for Physics and Chemistry.

At the University of Notre Dame:

Spring 2022:
Head teaching assistant for Calculus II.
Teaching assistant for the Mary E. Galvin Science and Engineering Scholars section of Calculus II.
Leader for reading course in graduate set theory (proof-based).

Fall 2021:
Head teaching assistant for Calculus I.
Teaching assistant for the Mary E. Galvin Science and Engineering Scholars section of Calculus I.
Leader for reading course in undergraduate logic (proof-based).

Summer 2019:
Primary instructor for Principles of Finite Math.

Fall 2019:
Primary instructor for Calculus II.

Spring 2018:
Tutor for Notre Dame's Math Bunker, a math help room for proof-based courses.
Assistant for reading course in mathematical logic for an undergraduate math major (proof-based).

Spring 2017:
Teaching assistant for Honors Calculus II (proof-based).

Fall 2017:
Primary instructor for Calculus A.

Fall 2016:
Teaching assistant for Calculus II.

Elsewhere:

Spring 2015:
Primary instructor for Senior Math (Introduction to Calculus) at the Santa Fe Waldorf Private School.

August 2014 - May 2015:
Senior Math and Lab assistant at St. John's College.

August 2013 - May 2014:
Calculus study group leader for the Colorado Mesa University Mathematics Department.
Mathematics tutor at the Colorado Mesa University Tutorial and Learning Center.

OTHER ACTIVITIES

Fall 2020: Program associate with the MSRI 2020 semester in Decidability, Definability, and Computability in Number Theory.

Fall 2017 and Spring 2018: Treasurer for the MGSA (Math Graduate Student Association).