RYAN CARPENTER

Doctoral student at the University of Illinois at Chicago pursuing a PhD in pure mathematics with a focus in mathematical and philosophical logic, model theory, and its applications.

https://homepages.math.uic.edu/~rcarpe5/

rcarpe5@uic.edu

(814) 897-6808

858 N Hoyne Ave, Unit 1, Chicago Il 60622

Education

Doctor of Philosophy in Pure Mathematics – Logic (in progress)

University of Illinois at Chicago

August 2022 – Present

Bachelor of Science in Mathematics and Philosophy

University of Pittsburgh

August 2016 – April 2020

- Cumulative GPA of 3.91
- Departmental Honors in Math and Philosophy Departments

Graduate Courses Taken

University of Illinois at Chicago

Courses:

- Math 512 (Topics Courses in o-Minimality and Computability Theory); Math 504 (Set Theory); Math 506 (Model Theory I); Math 507 (Model Theory II); Math 516 & 517 (Algebra Sequence); Math 552 (Algebraic Geometry); Math 547 (Algebraic Topology); Math 549 (Differentiable Manifolds); Math 514 (Number Theory I); Math 525 (Topics in Number Theory); Math 445 (Intro to Topology); Math 417 (Complex Analysis)
- Preliminary exams passed: Algebra (Math 516 and 517, Spring 2023) and Logic (Math 502 [skipped] and Math 504, Spring 2023); Minor sequence: Geometry and Topology (Math 547 and Math 549, Spring 2024)

Research:

- Dissertation work centering around o-minimality and differential algebra, especially concerning Schanuel-type conjectures, number theory, o-minimal groups, and permutation groups
- Reading groups in stability theory with James Freitag (Fall 2023), continuous logic with Gabriel Conant (Fall 2024), simplicity and stable group theory with James Freitag and Gabriel Conant (Spring 2025); open problem seminar examining hypergraph regularity lemmas and dividing lines between model theoretic divisions with James Freitag, Matthew Harrison-Trainor, John Baldwin, and Scott Mutchnik (Spring 2024)

University of Pittsburgh

Courses:

- MATH 2500 (Algebra 1); PHIL 2500 (Core Logic)

Teaching Experience

Graduate Teaching Assistant

University of Illinois at Chicago

Fall 2022 – Present

Courses:

- Math 110 College Algebra, Fall 2022 (3 sections)
- Math 180 Calculus 1, Spring 2023 (3 sections)
- Math 088 Intermediate Algebra Workshop, Fall 2023 (3 sections)
- Math 160 Finite Math for Business, Fall 2023 (1 section)
- Math 181 Calculus 2, Spring 2024 (3 sections)
- Math 121 Precalculus, Fall 2024 (3 sections)

Responsibilities:

- Lead classrooms of 20-30 students in homework-type exercises
- Distributed and monitored weekly quizzes
- Held short review sessions prior to every quiz and long review sessions prior to every exam
- Met with students outside the classroom during scheduled office hours and one-on-one sessions
- Proctored in-person student exams
- Created worksheets for student use in class
- Collaborated with other instructors to write syllabus, course schedule, and quizzes

Professional Tutor

Revolution Prep

Spring 2021 – Fall 2022

Responsibilities:

- Created individual learning plans to implement on students' behalf
- Virtually tutored students in high school and college on topics ranging from standardized test prep to honors physics, from AP Calculus to college-level symbolic logic

Mathnasium Center Director

Mathnasium of Squirrel Hill, Pittsburgh

Fall 2020 – Spring 2021

Responsibilities:

- Individually tutoring students in grade levels 2-12
- Virtually tutored students who elected to be tutored from home
- Selected specific topics for students to work on based on their individualized learning plan

Instructor

University of Pittsburgh

Fall 2020 – Spring 2021

Courses:

- MATH 0010 College Algebra Part One, Fall 2020
- MATH 0020 College Algebra Part Two, Spring 2021

Responsibilities:

- Lead classes of around 30 students to gain a better understanding of algebra
- Planned, delivered, and recorded online lectures which were then posted to the course page
- Created numerous additional help videos and supplemental resources to ensure student success
- Wrote and graded exams to accurately judge students' understanding of the material

Undergraduate Teaching Assistant

University of Pittsburgh

Spring 2019 – Spring 2020

Courses:

- MATH 0200 Prep for Scientific Calculus, Spring 2019

- MATH 0031 College Algebra, Fall 2019
- MATH 0200 Prep for Scientific Calculus, Spring 2020

Responsibilities:

- Lead classrooms of 20-30 students in homework-type exercises
- Distributed and monitored weekly quizzes
- Held short review sessions prior to every quiz and long review sessions prior to every exam
- Met with students outside the classroom during scheduled office hours and one-on-one sessions

Math Assistance Center Tutor

University of Pittsburgh

- Fall 2018 – Spring 2020
- Courses Tutored Include: MATH 0031 College Algebra, MATH 0120 Business Calculus, MATH 0200 Prep for Scientific Calculus, MATH 0220 Analytic Geometry and Calculus 1, MATH 0230 Analytic Geometry and Calculus 2, MATH 0240 Analytic Geometry and Calculus 3, MATH 0280 Intro to Matrices and Linear Algebra, MATH 0290 Applied Differential Equations, MATH 0400 Discrete Mathematical Structures MATH 0413 Intro to Theoretical Mathematics, MATH 0420 Theoretical 1-Variable Calculus, MATH 0430 Intro to Abstract Algebraic Systems, MATH 1180 Linear Algebra, MATH 1270 Ordinary Differential Equations 1

Note-taker and Personal Tutor for Visually Impaired Student

University of Pittsburgh

Fall 2019 – Spring 2020

Courses Tutored:

- MATH 0220 Analytic Geometry and Calculus 1, Fall 2019
    - Grade Received by Student: A
- MATH 0230 Analytic Geometry and Calculus 2, Spring 2020
    - Grade Received by Student: A+

Responsibilities:

- Attended lectures and wrote lecture notes into LATEX files compatible with braille technology used by student
- Presented Calculus 1 and Calculus 2 level lectures for student and acted as a scribe when taking quizzes and exams

Older Research Experiences

Research in Algebraic Geometry with Dr. Bogdan Ion (U. of Pittsburgh)

University of Pittsburgh

Spring 2021 – Summer 2022

Responsibilities:

- Worked under Professor Bogdan Ion to implement Galois Theory and skills in algebra to discover neusis constructions of regular polygons
- Organized and wrote a paper on neusis constructions of the regular heptagon
- Set research questions and tasks and approached problems from many different perspectives

Research Assistant

University of Pittsburgh

Fall 2017 – Spring 2018

Responsibilities:

- Worked under Professors James Mueller and Joseph Boudreau in Physics Department
- Tested and assured quality of electrical circuit boards to be used in CERN Project

Selected Talks

Louise Hay Logic Seminar – University of Illinois at Chicago

"A Brief Survey of the Hyperreal Numbers," given on March 7, 2024

Louise Hay Logic Seminar – University of Illinois at Chicago

"Paradox, Cardinals, Gödel, and Cantor," given on October 5, 2023

23rd Annual Graduate Student Conference in Logic – University of Illinois at Chicago

"1 + 1 = 2: I Read *Principia Mathematica* So You Don't Have To," given on April 16, 2023

Louise Hay Logic Seminar – University of Illinois at Chicago

"Modal Model Theory: A Potential Foundation for Mathematics?," given on March 6, 2023

Louise Hay Logic Seminar – University of Illinois at Chicago

"On Relevant Arithmetic," given on November 7, 2022

Honors

Summa Cum Laude Honors

University of Pittsburgh, 2020

Montgomery M. Culver Award

University of Pittsburgh, 2020

Valedictorian

General McLane High School, 2016

Miscellaneous Skills

- **Java Proficiency**
- **LATEX Proficiency**
- **American Sign Language Fluency**
- **Creative Problem-Solving**
- **Interpersonal Communication**
- **Leadership**
- **Public Speaking**