WILL HOFFER

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EDUCATION

University of California, Riverside September 2019 - Present

- Masters of Mathematics June 2021
- PhD Doctoral Candidate Advanced June 2021
- Thesis Advisor: Dr. Michel L. Lapidus
- Overall GPA: 3.98/4.00

The Ohio State University August 2015 - May 2019

- Bachelors of Science in Mathematics and Physics
- Graduated with Honors in the Arts & Sciences (i.e. from the Honors Program)
- Overall GPA: 3.68/4.00; graduated *cum laude*)

PROFESSIONAL APPOINTMENTS

Associate Instructor Winter 2022-Fall 2022
Mathematics Department *University of California, Riverside*

- I have been the primary instructor for a university mathematics course. See the teaching experience section for more information.

Teaching Fellow Fall 2021
Mathematics Department *University of California, Riverside*

- I provided essential mentorship and teaching training for first year graduate students, including teaching observations, individual meetings, and progress reports.

UCR Graduate Division: Graduate Student Mentor Fall 2021 - Spring 2022
https://gradmentors.ucr.edu/ *University of California, Riverside*

- I mentor a group of first year graduate students, helping them to adjust and succeed at UCR.

Microtutorials in Mathematics Video Program Spring 2020
https://microtutorials.ucr.edu/ *University of California, Riverside*

- Content creator for UCR's mathematics supplementary instructional videos project

Teaching Assistant September 2019 - Present
Mathematics Department *University of California, Riverside*

- I have been the teaching assistant, additional lecturer, and/or grader for a variety of different courses, and have taught both online and in-person. See the teaching experience section for more information.

Student Instructional Associate August 2016 - Spring 2019
Mathematics Department *The Ohio State University*

- I was a teaching assistant and grader for lower division courses, and I was a tutor for the Mathematics and Statistics Learning Center. See the teaching experience section for more information.

RESEARCH & PUBLICATIONS

Research Interests

· My research interests include resurgence, asymptotic analysis, fractal geometry and the associated theory of complex dimensions, analytic number theory and explicit formulae therein, spectral geometry and inverse spectral problems, functional analysis, and mathematical physics, especially in its overlap with these other topics.

Publications

· W. Hoffer, A. Vengal, and V. Winstein, "The Structure of Biquandle Brackets," *Journal of Knot Theory and its Ramifications*, Vol. 29, Is. 6 (May 2020.) https://doi.org/10.1142/S021821652050042X

AWARDS & HONORS

Research Accolades

· First Place in the Research Poster Competition at James Madison's Shenandoah Undergraduate Mathematics and Statistics Conference (SUMS) Conference (2018), in collaboration with my co-authors Adu Vengal and Vilas Winstein

Academic Accolades

· Phi Beta Kappa Honorary Society Member

GRANTS & FELLOWSHIPS

The Jones Fellowship Winter 2023
https://mathdept.ucr.edu/jones-fellowship

· I received a fellowship for academic and research support equivalent to a half-teaching appointment based on academic merit and department service.

The John C. Fay Fellowship Winter/Spring 2023
https://sites.google.com/view/ucr-vsdl-fay-fellowship/

· I am the first Fay Fellow and ran the "Big C Seminar," giving a series of two lectures and two discussions to prepare graduate students for the invited Victor L. Shapiro Distinguished Lecture in Mathematics given by Sir Michael Berry.

Department of Mathematics Teaching Fellow Fall 2021
University of California, Riverside

· I provided essential mentorship and teaching training for first year graduate students, including teaching observations, individual meetings, and progress reports.

CONFERENCE PRESENTATIONS & INVITED SEMINAR TALKS

These are the conferences and institutions at which I have presented my research and/or been invited to give a talk.

California State University: Graduate Mathematics Seminar Spring 2023
https://math.csuci.edu/current-students/seminar.htm

· *On Inexact Explicit Formulae in Fractal Geometry and Number Theory* 04/03/2023

California State University: Undergraduate Mathematics Seminar Spring 2023
https://math.csuci.edu/current-students/seminar.htm

· *Can One Hear the Shape of a Fractal Drum?* 04/03/2023

Joint Mathematics Meeting January 2023
https://www.jointmathematicsmeetings.org/meetings/national/jmm2023/2270_program_specss1.html

· *On Asymptotic Expansions with Complex Exponents and their Applications* 01/06/2023

7th Cornell Conference on Analysis, Probability, and Mathematical Physics on Fractals June 2022
https://alexander-teplyaev.uconn.edu/cornell7/speakers/

· *Tube Formulae for Generalized von Koch Fractals* 06/05/2022

American Mathematical Society, Western Sectional Meeting Spring 2022
https://meetings.ams.org/math/spring2022w/meetingapp.cgi

· *Borel Summability and Series with Complex Powers* 05/14/22

American Mathematical Society, Western Sectional Meeting Fall 2021
http://www.ams.org/amsmtgs/2283_abstracts/1172-30-203.pdf

· *On Stokes Phenomena and Geometric Zeta Functions* 10/23/2021

American Mathematical Society, Western Sectional Meeting May 2021
https://www.ams.org/amsmtgs/2282_abstracts/1167-51-151.pdf

· *On resurgent analysis of explicit formulae in fractal geometry* 05/01/2021

Functional Analysis and Mathematical Phyiscs Seminar Decemeber 2020
https://www.fresnostate.edu/csm/math/colloquia-seminars/famp.html *CSU Fresno*

· *From Rainbows to Resurgence: Asymptotics of the Airy Function* 12/11/20

CONFERENCES, WORKSHOPS, & RESEARCH PROGRAMS

These are the conferences, workshops, and research programs which I have attended, presented at, and/or been an active participant in.

California State University Invited Talks Spring 2023
https://math.csuci.edu/current-students/seminar.htm

· I was invited to speak at California State University, and I gave two talks: one to undergraduate mathematicians and another about my PhD research.

Joint Mathematics Meeting January 2023
https://www.jointmathematicsmeetings.org/meetings/national/jmm2023/2270_program_spects1.html

· I presented my research at the Joint Mathematics Meeting the the Spectra Special Session on Research by LGBTQ+ Mathematicians.

LGBTQ+ Math Day Annually on November 18
http://www.fields.utoronto.ca/activities/22-23/LGBTQplus *The Fields Institute*

· I attend the LGBTQ+ Math day conferences about research and experiences of LGBTQ+ mathematicians in 2020 and 2021.

7th Cornell Conference on Analysis, Probability, and Mathematical Physics on Fractals June 2022
https://alexander-teplyaev.uconn.edu/cornell7/speakers/

· I presented on my current research regarding tube formula and von Koch snowflakes.

American Mathematical Society, Western Sectional Meeting October 2021
http://www.ams.org/amsmtgs/2283_abstracts/1172-30-203.pdf

· I was an invited speaker for the Special Session on Research in Mathematics by Early Career Graduate Students.

Spectra LGBTQ+ in Mathematics Conference August 2021
https://icerm.brown.edu/topical_workshops/tw-21-smc/

· I attended the first official mathematics conference hosted by Spectra, which included both mathematical research and discussion of obstacles and current work to advance diversity, inclusion, and equity in the field of mathematics.

Summer Graduate School on Random Conformal Geometry July 2021
Program– The Analysis and Geometry of Random Spaces
https://www.msri.org/summer_schools/922 *Mathematical Sciences Research Institute (MSRI)*

· I was an active participant in a series of lectures and associated problem sessions.
· We covered topics such as Schramm-Loewner evolution (SLE), conformal and quasi-conformal geometry, conformal quantum field theories, etc.

American Mathematical Society, Western Sectional Meeting May 2021
https://www.ams.org/amsmtgs/2282_abstracts/1167-51-151.pdf

· I was an invited speaker for the Special Session on Research in Mathematics by Early Career Graduate Students.

Spring school on asymptotic methods and applications March 2021
Program– Applicable resurgent asymptotics: towards a universal theory
https://www.newton.ac.uk/event/araw01/ *Isaac Newton Institute (INI)*

· I was an active participant in a series of lectures and associated problem sessions.
· We covered resurgence as it appears in many forms, including topics such as saddle-point analysis, WKB semiclassical asymptotics, partial differential equations, and Jean Écalle's general theory.

Southern California Analysis and
Partial Differential Equations Conference November 2019
(SCAPDE) *University of California, San Diego*

· I attended the conference, with talks described here: `https://mathweb.ucsd.edu/~scapde/2019/SCAPDE_2019_TA.pdf`.

American Mathematical Society, Western Sectional Meetings Fall 2019 - Present

· I have been an attendee at many western sectional meetings, held twice a year in the fall and spring (with the exception of the year 2020.) I have listed those in which I was an active speaker separately.

Shenandoah Undergraduate Mathematics and Statistics Conference 10/13/18
http://www.jmu.edu/mathstat/sums/index.shtml *James Madison University*

· My collaborators and I presented our research poster on our work entitled: *Combining Biquandle Knot Invariants*

Young Mathematicians Conference August 2018
https://ymc.math.osu.edu/2018/program.php *Ohio State/National Science Foundation*

· My collaborators and I presented our research in a talk entitled: *Combining Quandle Cohomological and State-Sum Polynomial Knot Invariants*

Denman Research Forum March 2018
https://ugresearch.osu.edu/Pages/Initiatives-%20Denman-%20Accepted%20Abstracts.aspx *Ohio State*

· I presented a research posted entitled: *Invariants for tricolorable knots & links*

Knots & Graphs Program Summer 2017 & Summer 2018
https://people.math.osu.edu/chmutov.1/wor-gr-su18/wor-gr.htm *The Ohio State University*

· I participated in a research program focused on the mathematical theory of knots. As part of the program, I gave a series of talks with my collaborators and produced research that went on to be published in an academic journal.

HOME CAMPUS/DEPARTMENT TALKS

Fractal Analysis, Dynamical Systems, and Mathematical Physics Seminar 2020-Present
http://www.math.ucr.edu/~frgmpds/seminars.html *University of California, Riverside*

- *On Spaces of Formal and Analytic Expansions with Exponents in the Complex Plane* 02/23/23
- *Toward Tube Formulae for Generalized von Koch Fractals* 05/20/22
- *Borel Summation and Series with Complex Powers* 02/17/22
- *On the Stirling Series for the Gamma Function* 02/10/22
- *On Heat Content Asymptotics of some Planar Fractals* 11/04/2021
- *On Zeta Functions and the Stokes Phenomenon* 04/15/21
- *Rainbows Quantum Billiards, and the Birth of Reflections: Segue into Resurgence* 11/12/20
- *Rainbows Quantum Billiards, and the Birth of Reflections: Stokes Phenomena Exemplified* 10/22/20
- *A First Introduction to Resurgence, Part II* 5/27/20
- *A First Introduction to Resurgence, Part I* 4/16/20

Mathematical Physics: Experiment, Structure, & Framework Seminar Winter 2022 - Present
University of California, Riverside

- *Discussion on Geometric Optics, Mathematical Catastrophes, and Related Topics* 04/14/23
- *Classifying Optical Caustics with Elementary Catastiophies* 02/24/23
- *Asymptotics of the Airy Function* 03/03/22

Analysis Seminar Spring 2022 - Present
https://sites.google.com/ucr.edu/ucranalysisseminar/home *University of California, Riverside*

- *On the Stirling Series for the Gamma Function* 02/10/22

Graduate Student Seminar Winter 2020 - Present
https://ams-at-ucr.github.io/gradsem/ *University of California, Riverside*

- *Snow White Light & the Seven Elementary Catastrophies* 02/17/23
- *Functions that Count* 01/27/23
- *Divergence is only the Beginning* 01/14/22
- *Sites & Bytes: Website Workshop* 11/19/21
- *Melting Snowflake Fractals* 11/12/21
- *This is not the title of this talk* 10/08/21
- *On Resurgent Analysis of Explicit Formulae in Fractal Geometry* 04/30/2021
- *Resurgence & Fractals* 01/15/2021
- *Keeping up with the Bernoulli's* 01/31/2020

Analytic Number Theory Fall 2021
Mathematics Course Presentation (Math 245) *University of California, Riverside*

- *Explicit Formulae in Number Theory* 12/07/21

Fractal Geometry, Complex Dimensions, & Zeta Functions Fall 2020
Mathematics Course Presentation (Math 260) *University of California, Riverside*

- *Proof of the Pointwise Explicit Formula* 12/17/20

Mathematics of Quantum Mechanics Winter 2020
Mathematics Course Presentation (Math 242) *University of California, Riverside*

· *Deriving the Schrodinger Equation from Feynmann's Path Integral* 03/13/20

Wave Equations and General Relativity Seminar Fall 2021-Spring 2020
Mathematics Seminar *University of California, Riverside*

· *Calculus on Manifolds, Part I* 12/03/2019
· *Calculus on Manifolds, Part II* 1/07/2020
· *Introduction to the Physics of Relativity* 4/13/20
· *The Einstein Equation Cauchy Problem* 05/11/20

Knots & Graphs Program Summer 2017 & Summer 2018
https://people.math.osu.edu/chmutov.1/wor-gr-su18/wor-gr.htm *The Ohio State University*

· *Enhanced Kauffman bracket* 7/7/17
· *Tricoloring number of links* 7/21/17
· *Tricolorings, Keis, and Quandles* 6/25/18
· *Two cocycles of quandles and the state sum invariants* 7/9/18
· *Cohomology, biquandles, and bracket invariants* 7/23/18

Reading Classics Seminar Spring 2017 - Autumn 2018
https://people.math.osu.edu/sinnott.1/ReadingClassics/ *The Ohio State University*

· *Origami & Geometry - Paper Folding and Greek Geometry* 3/28/18
· *Kepler's Laws in Newton's 'Philosophiæ Naturalis Principia Mathematica'* 9/11/18
· *Euler's 'Principia pro motu de sanguinis per arterias determinando'* 10/31/18

What Is...? Seminar 6/14/18
https://math.osu.edu/whatis *The Ohio State University*

· *What is the Yang-Baxter Equation?*

Abstract Algebra, Math 5590H 11/29/18
https://people.math.osu.edu/gautam.42/A18/calendar.html *The Ohio State University*

· *The Stone-von Neumann-Mackey Theorem: Equivalence of Heisenberg Group Representations*

TEACHING EXPERIENCE

Associate Instructor Winter 2022-Spring 2022
Mathematics Department *University of California, Riverside*

· I have been the primary instructor of record for the following courses at UCR:

- Calculus for Life Sciences - Math 7B (Fall 2022)
  Undergraduate; Size: 88 Students; Format: In-Person
- Calculus for Life Sciences - Math 7B (Spring 2022)
  Undergraduate; Size: 69 Students; Format: In-Person
- Calculus for Life Sciences - Math 7A (Winter 2022)
  Undergraduate; Size: 91 Students; Format: Hybrid (Online & In-Person)

Department Instructor Summer 2022
Mathematics Department *University of California, Riverside*

· I have been employed as the primary instructor for two graduate level summer preparation courses.

- Real Analysis Qualification Exam Preparation Seminar
  Graduate; Size: 6 Students; Format: Hybrid (Online & In-Person)
- Complex Analysis Qualification Exam Preparation Seminar
  Graduate; Size: 8 Students; Format: Hybrid (Online & In-Person)

Teaching Fellow Fall 2021
Mathematics Department *University of California, Riverside*

· I help mentor and train new graduate students, in particular those who are new to teaching.
· I observed graduate student teaching and provided feedback to the students. At the end of the quarter, I wrote reports on their progress to the department.

Microtutorials in Mathematics Video Program Spring 2020
https://microtutorials.ucr.edu/ *University of California, Riverside*

· I was a content creator for UCR's mathematics supplementary instructional videos project. These instructional videos and materials are used as assignments in mathematics courses.

Teaching Assistant September 2019 - Present
Mathematics Department *University of California, Riverside*

· I have been the teaching assistant, additional lecturer, and/or grader for a variety of different courses, and have taught both online and in-person.
· Upper Division Courses:

- Ordinary and Partial Differential Equations
- Introduction to Chaotic and Complex Dynamical Systems
- Advanced Calculus/Introduction to Measure Theory

· Lower Division Courses:

- Introduction to College Mathematics for Business and the Social Sciences
- Precalculus (Study of Elementary Functions, Roots of Polynomials, etc.)
- First Year Calculus
- Calculus for Life Sciences

- Applied Linear Algebra
- Calculus of Several Variables

Student Instructional Associate August 2016 - Spring 2019
Mathematics Department *The Ohio State University*

· I was a teaching assistant and grader for lower division courses, and I was a tutor for the Mathematics and Statistics Learning Center.
· Courses Taught:

- College Algebra
- Trigonometry
- Precalculus

LEADERSHIP, PROFESSIONAL SERVICE, & OUTREACH

Professional Memberships

· American Mathematical Society (AMS) Member September 2019 - Present
· Spectra: The Association for LGBTQ+ Mathematicians Member November 2020 - Present

President of the AMS Graduate Student Chapter September 2021-Present
Local to the University of California, Riverside (UCR) *American Mathematical Society (AMS)*

· I am the lead officer, and I am in charge of running UCR's Graduate Student Seminar.

Vice President of UCR's GSA Department Chapter September 2022-Present
Graduate Student Association (GSA) *University of California, Riverside*

· I am an officer for the department's local chapter of the university wide graduate student association. We interface with the organization as a whole and plan department events.

Mentorship Positions (Volunteer & Employment)

· University of California, Riverside: Graduate Student Mentor (Fall 2021 - Spring 2022)
· University of California, Riverside: Teaching Fellow (Fall 2021)
· Ohio State University Honors & Scholars Program Peer Mentor (August 2016-May 2019)

SOFTWARE PROFICIENCY

Programming Languages

· Proficient: Java/Javascript, Python, C/C++, HTML/CSS/SCSS
· Familiar: Ruby, R, Liquid, Julia

Software Programs/Tools

· Proficient: Mathematica, LaTeX, Git/GitHub, RStudio, VSCode
· Familiar: MatLab