



GRADUATE STUDY *at*



RICE

THE PROGRAMS

Rice University offers an excellent program in mathematics leading to a Ph.D. The commitment and reputation of the faculty, our small class sizes, the opportunities to select from a wide range of directed research areas, and the university's connection with Houston's premier research, science and educational institutions are all qualities that set our graduate program apart from those offered by other high-ranking universities. Rice provides a unique learning environment for graduate study. With approximately 25 faculty and 34 graduate students in the department (six to eight new students admitted each year), the low student-to-faculty ratio encourages easy interaction. Students flourish within a setting that features small interactive seminars, reading courses and one-on-one instruction. Faculty members take a personal interest in their students, both during their studies and after graduation. Our students also have the opportunity to interact with graduate students and faculty in the Rice Department of Computational and Applied Mathematics.

FACULTY/CURRENT RESEARCH

The department has a small, highly dedicated faculty consisting of permanent members and instructors, plus frequent visitors and postdoctoral fellows. They have broad expertise in differential and algebraic geometry, partial differential equations, topology, analysis, combinatorics, number theory, dynamics and mathematical physics. With graduate training from the best universities in the world, faculty members are actively engaged in research, and many receive support from the National Science Foundation (NSF) and occasionally from other national agencies and foundations. Several are representatives on committees of the NSF and the American Mathematical Society, and a number edit major mathematical journals. The caliber of the faculty is demonstrated by the awards they have received: five CAREER awards from the NSF, nine Fellows of the American Mathematical Society, several teaching awards and ten Sloan Foundation Fellowships.

Sinan Arıturk. G. C. Evans Instructor. Ph.D. (2012) Johns Hopkins University. Analysis and partial differential equations. Eigenfunctions of the Laplace-Beltrami operator on a compact Riemannian manifold.

Christian Bick. Postdoctoral Research Associate/Lecturer, Ph.D. (2012) Max Planck Institute for Dynamics and Self-Organization. Dynamical systems theory, theoretical neuroscience.

Michael Boshernitzan. Professor. Ph.D. (1981) Weizmann Institute of Science (Israel). Hardy fields, ergodic theory.

Alexander Bufetov. Adjunct Associate Professor. Ph.D. (2005) Princeton University. Ergodic theory, Teichmüller theory, dynamics.

John Calabrese. RTG/Lovett Instructor. Ph.D. (2013) University of Oxford. Algebraic geometry, Hall algebras and Donaldson-Thomas invariants.

Tim Cochran. Professor. Ph.D. (1982) University of California at Berkeley. Topology of manifolds, knot theory, group theory.

David Damanik. Wiess Career Development Chair, Professor and Chair. Ph.D. (1998) Johann Wolfgang Goethe-Universität. Analysis, mathematical physics, spectral theory.

Danijela Damjanović. Associate Professor. Ph.D. (2004) Pennsylvania State University. Dynamical systems and ergodic theory.

Michael Field. Research Professor, Ph.D. (1970) University of Warwick. Geometry and dynamics.

Robin Forman. Professor Emeritus. Ph.D. (1985) Harvard University. Relationships between topology and analysis, mathematical physics, combinatorial geometry.

Neil J. Fullarton. G. C. Evans Instructor, Ph.D. (2014) University of Glasgow. Geometric Group Theory, low-dimensional topology.

GRADUATE STUDY IN MATHEMATICS

RICE UNIVERSITY

MATH.RICE.EDU

FOR ADMISSION
IN 2015

Zhiyong Gao. Associate Professor. Ph.D. (1984) State University of New York at Stony Brook. Differential geometry, partial differential equations.

Robert Hardt. W.L. Moody Professor. Ph.D. (1971) Brown University. Geometric measure theory, partial differential equations, continuum mechanics.

Reese Harvey. Professor Emeritus of Mathematics. Ph.D. (1966) Stanford University. Several complex variables, partial differential equations, differential geometry.

Shelly Harvey. Associate Professor. Ph.D. (2002) Rice University. Low-dimensional topology, geometry.

Brendan Hassett. Milton Brockett Porter Professor. Ph.D. (1996) Harvard University. Algebraic geometry.

John Hempel. Milton Brockett Porter Emeritus Professor. Ph.D. (1962) University of Wisconsin. Topology of manifolds and associated algebraic problems, primarily in group theory.

Raymond Johnson. Adjunct Professor in Mathematics. Ph.D. (1969) Rice University. Partial differential equations.

Frank Jones. Noah Harding Professor. Ph.D. (1961) Rice University. Partial differential equations, real analysis.

Kyle Kinneberg. G. C. Evans Instructor. Ph.D. (2014) University of California, LA. Complex analysis, quasiconformal geometry, hyperbolic groups.

Alexander Kiselev. Professor. Ph.D. (1996) California Institute of Technology. Analysis and applications, partial differential equations, fluid dynamics, Fourier analysis, reaction-diffusion equations, mathematical biology, spectral and dynamical theory of Schrödinger operators.

David Krcatovich. G. C. Evans Instructor. Ph.D. (2014) Michigan State University. Low-dimensional topology, knot theory, Heegaard Floer homology.

Ye Luo. G. C. Evans Instructor. Ph.D. (2014) Mathematics and Electrical Engineering, Georgia Institute of Technology. Algebraic geometry, tropical curves and Berkovich spaces.

Alison Moore. RTG/Lovett Instructor. Ph.D. (2013) University of Texas. Low dimensional theory and knot theory.

Ina Petkova. G.C. Evans Instructor. Ph.D. (2012) Columbia University. Knot theory and low-dimensional topology, Heegaard Floer homology.

John C. Polking. Professor Emeritus. Ph.D. (1966) University of Chicago. Partial differential equations, several complex variables.

Andrew Putman. Associate Professor. Ph.D. (2007) University of Chicago. Topology.

Richard Shadrach. G. C. Evans Instructor. Ph.D. (2014) Michigan State University. Arithmetic geometry, algebraic geometry, number theory.

Stephen W. Semmes. Noah Harding Professor. Ph.D. (1983) Washington University. Harmonic analysis, complex variables, partial differential equations, differential geometry.

Sho Tanimoto. G.C. Evans Instructor. Ph.D. (2012) Courant Institute of Mathematical Sciences, New York University. Algebraic geometry, arithmetic geometry, and analytic number theory.

Anthony Várilly-Alvarado. Assistant Professor. Ph.D. (2009) University of California, Berkeley. Algebraic geometry, higher-dimensional arithmetic algebraic geometry, Brauer-Manin obstructions.

William A. Veech. Edgar Odell Lovett Professor. Ph.D. (1963) Princeton University. Analysis.

Raymond O. Wells, Jr. Professor Emeritus of Mathematics. Ph.D. (1965) New York University. Several complex variables and wavelets.

Michael Wolf. Professor. Ph.D. (1986) Stanford University. Teichmüller theory, differential geometry, minimal surfaces.

Yunhui Wu. G.C. Evans Instructor. Ph.D. (2012) Brown University. Riemann Surfaces, Weil-Petersson geometry, CAT (0) geometry.

William Yessen. Senft Instructor and National Science Foundation Postdoctoral Fellow. Ph.D. (2013) University of California, Irvine. Smooth and holomorphic dynamical systems, ergodic theory, thermodynamic formalism, mathematical physics

Zhenghe (Zach) Zhang. G. C. Evans Instructor. Ph.D. (2014) Northwestern University. Dynamical systems, spectral theory.

FACILITIES

The Department of Mathematics is housed in Herman Brown Hall, located on the north side of the Rice campus. All individual and administrative offices and most classes are here. Two rooms are available on the fourth floor for study sessions and seminars. All graduate students have computer accounts on the mathematics department server and easy access to various departmental computers. Herman Brown Hall, as most of Rice University, has Wi-Fi, and every graduate office is equipped with a desktop computer.

TEACHING

At Rice, a student will spend a modest amount of time each week on teaching-oriented activities, such as providing one-on-one instruction during homework sessions or tutorial sessions, grading or supervising teams of graders. Graduate students in the department also have the opportunity to gain classroom experience, usually by teaching one or two courses during their tenure at Rice as well as in the Rice University summer school program.

RESEARCH CENTERS AND OTHER INSTITUTES

Facilitating the wide variety of independent and collaborative research projects in which mathematics department faculty and students are engaged are the university's libraries, centers and computers.

Fondren Library houses a collection of more than 2.5 million volumes, 3 million microfilms, 18,409 current periodicals and other serial titles, and many electronic resources.

Computing resources and information, including short courses and consultation, are readily available from the Rice Computer Consulting Center and from divisional and departmental computer support personnel.

Rice University is home to many scientific centers and institutes, including:

Center for Research on Parallel Computation
Center for Technology in Teaching and Learning
The Ken Kennedy Institute for Information Technology
Rice Quantum Institute
W.M. Keck Center for Computational Biology

MATHEMATICALLY RELATED DEPARTMENTS:

Department of Mathematics
Physical Address: 220 Herman Brown Hall
Web site: www.math.rice.edu

Department of Computational and Applied Mathematics
Physical Address: 1079 Duncan Hall
Web site: www.caam.rice.edu

Department of Computer Science
Physical Address: 3121 Duncan Hall
Web site: www.cs.rice.edu

Department of Statistics
Physical Address: 1083 Duncan Hall
Web site: www.stat.rice.edu

COLLABORATION WITH OTHER INSTITUTIONS

Graduate student life in the mathematics department is enhanced by the university's proximity to other research institutions, including the University of Houston, Texas A&M University and the University of Texas at Austin; the biannual Texas Geometry and Topology Conference rotates among eight Texas schools including these three universities and Rice. Other regional annual conferences include the Texas Algebraic Geom-



etry Symposium, Texas Partial Differential Equations Seminar and the Louisiana–Texas Topology Retreat. Graduate students frequently receive support to attend these and other national mathematics conferences.

We have a local Association for Women in Mathematics (AWM) chapter organized and run by the women of the Rice University Department of Mathematics. The group sponsors mathematics lectures by women faculty members and serves as a forum for the discussion of issues relating to women in the mathematical sciences. The Department of Mathematics is an institutional member of the Mathematical Sciences Research Institute, American Mathematical Society and Mathematical Association of America. This provides some benefits to all graduate students in mathematics.

RECENT PH.D. GRADUATES, DISSERTATIONS AND CURRENT POSITIONS

2014

James Cooper (B.S., University of Texas at Austin) “Two mod- p Johnson Filtrations”.

Senior Knowledge Engineer at Reasoning Mind

Paul Munger (B.A., Rice University) “Spectral Regularity in Some Models of Aperiodic Order”.

Darren Ong (B.S., Texas Christian University) “Spectral characteristics of aperiodic CMV and Schroedinger operators”.
Post Doc, University of Oklahoma.

Arunima Ray (B.A., State University of New York at Geneseo) “Casson towers and filtrations of the smooth knot concordance group”.
Instructor at Brandeis University

Letao Zhang (B.S., Nanjing University) “Deformations of Hilbert Schemes of Points on $K3$ Surfaces and Representation Theory”.
Simons Instructor at Stony Brook

2013

Taylor Martin (B.S., University of Rochester) “Lower order solvability of links”.
Assistant Professor (tenure track), Sam Houston State University

Reagan McNeil (B.A., Smith College) “A new filtration of the Magnus kernel”.
Assistant Professor (tenure track) University of Evansville

2012

Colin Carroll (B.S., Williams College)
“Some Variational Analysis on Differential Forms in Metric Spaces”
Analytics Developer, Spiceworks

Christopher Davis (B.S., Westminster College)
“First order invariants and linear independence in the concordance Group”
Zassenhaus Assistant Professor, Ohio State University

Bridget Franklin (B.S., University of Kansas)
“The Effect of Infecting Curves on Knot Concordance”
Consultant, Boston Consulting Group

GRADUATE STUDY IN MATHEMATICS AT A GLANCE

Degrees awarded: Ph.D., M.A. (for partial completion of doctoral program).

Fields of study: Geometry, topology, analysis, partial differential equations, mathematical physics, combinatorics, algebraic geometry, number theory, dynamics.

Faculty working with students: 25

Students: 34 graduate students

Number of applicants in 2014: 101

Number of applicants offered admission in 2014: 17

Number of new graduate students for fall 2014: 6

Number of new graduate students receiving financial aid: 6

Minimum 11-month award: \$23,000

Special programs offered by the department: Travel and summer school teaching

Degree requirements for the PhD:

1. Pass three preliminary examinations, covering basic material in algebra, analysis and topology by January of the second year of study.
2. Pass an advanced examination that covers material in the student’s chosen field of specialization within a year of passing the preliminary exams.
3. Pass a reading examination in one foreign language chosen from French, German and Russian.
4. Write an original thesis on a topic chosen in collaboration with a Ph.D. adviser, and present an oral defense of the thesis acceptable to the department.

In addition, Ph.D. students are required to spend two years in full-time study at Rice.

Average number of years to complete the doctoral program: 5.5

Doctorates awarded in 2014: 5

Zheng Gan (B.S., University of Science and Technology, China)
“Spectral Properties of Limit-Periodic Schröder Operators”
Seismic data analyst at CGGVeritas

Evelyn Lamb (B.S., University of North Texas)
“Harmonic Maps and the Indiscrete Components of the Representation Space”
Post Doc, University of Utah

Renee Laverdiere (B.S., Holy Cross College)
“Behavior of the Geodesic Length Function on Grafting Rays”
Consultant, Boston Consulting Group

Zhiyuan Li (B.S., University of Science and Technology, China)
“Rational Points on $K3$ Surfaces over function field of complex curve”
Szegő Assistant Professor, Stanford University

Fei Xu (B.S., University of Science and Technology, China)
“On the Smooth Linear Section of the Grassmannian $Gr(2,n)$ ”
Wells Fargo, Dallas

2011

Janine Dahl (B.A., St. Olaf College)
“The Spectrum of the Off-diagonal Fibonacci Operator”
Faculty, Inver Hills Community College, Inver Grove Heights, MN

Jonathan Fickenscher (B.S., University of Texas at Dallas)
“Self-Inverses in Rauzy Classes”
Instructor, Princeton University

Shuijing Li (B.S., University of Science and Technology of China)
“Rational points on del Pezzo surfaces of degree 1 and 2”
Baker-Hughes

Thomas McGaffey (B.A., Rice University)
“Regularity and nearness theorems for families of local Lie groups”
Instructor, San Jacinto Junior College

Carolyn Otto (B.S., University of Wisconsin–Eau Claire)
“The (n) -Solvable Filtration of the Link Concordance Group and Milnor’s Invariants”
Tenure-track faculty, University of Wisconsin–Eau Claire

Ryan Scott (B.S., Mathematics, and B.S. 2005, Physics, Oklahoma State University)
“Minimizing the mass of the codimension two skeleton for unit volume convex polyhedra”
VIGRE Postdoctoral Fellow, University of Georgia

2010

Jon Chaika (B.S., University of Iowa)
“Interval Exchange Transformations: Topological mixing Hausdorff dimensions for ergodic measures and disjointness”
National Science Foundation Postdoctoral Fellow, University of Chicago

Andrew Elliott (B.A., Rice University; M.A., UCLA)
“State Cycles, Quasipositive Modification, and Constructing H-Thick Knots in Khovanov Homology”
Applied Research Mathematician, Department of Defense

Helge Krüger (M.S., University of Vienna)
“Positive Lyapunov Exponent for Ergodic Schrödinger Operators”
Simons Foundation Fellow in Theoretical Physics, California Institute of Technology

Karoline Pershell Null (B.S., University of Tennessee–Martin)
“Some conditions for recognizing a 3-manifold group”
Tenure Track Assistant Professor, University of Tennessee–Martin

HISTORY OF RICE MATHEMATICS

Rice University has a tradition of excellence in mathematics that reaches back to its beginnings. The university, then the Rice Institute, was planned by a mathematician, Edgar Odell Lovett, who was the first professor of mathematics and the university’s president on the opening of the school in 1912. In addition to President Lovett, the initial faculty consisted of Percy Daniell and Griffith C. Evans. It was while at Rice that Daniell developed the theory of the Daniell integral, which remains an important part of the modern theory of integration. G. C. Evans’s work on potential theory earned him an international reputation and membership in the National Academy of Sciences. The first Rice Ph.D. degree was awarded in 1918 in mathematics.

ADMISSION/FINANCIAL AID AT A GLANCE

Entrance requirements:

- Official transcripts from all colleges and universities attended
- The results of the Graduate Record Examination, taken within the last three years; math subject exam is required.
- Three letters of recommendation from faculty who are familiar with the applicant
- If English is a second language, test scores from the Test of English as a Foreign Language are required

Application deadline: Jan. 1, 2015

Application fee: \$85

Tuition: \$39,880

Other fees: \$600

Late applications may be considered until April 15, 2015. However, candidates who miss the initial deadline place themselves in a less competitive position. In addition, all graduate students are required to have health insurance. Two plans are available for purchase through the university by students not otherwise insured. The university supplements the cost of this insurance.

For further information about the department, contact:

Anthony Varilly-Alvarado
Chair, Graduate Admissions
Department of Mathematics—MS 136
Rice University
P.O. Box 1892
Houston, Texas 77251-1892
Phone: 713-348-2851 • Fax: 713-348-5231
E-mail: av15@rice.edu
Web site: www.math.rice.edu

For more information about mathematics-related studies at Rice, some suggested Web sites are:

www.math.rice.edu
www.caam.rice.edu
www.cs.rice.edu
www.stat.rice.edu

THE FOLLOWING MATHEMATICS GRADUATE STUDENTS CAN ALSO ANSWER QUESTIONS ABOUT MATHEMATICS STUDY AND STUDENT LIFE AT RICE:

Jacob Fillman (B.S., 2009, Baylor University) jsf3@rice.edu

Katherine Vance (B.S., 2010, Columbia University) kvance@rice.edu

Jorge Acosta (B.S., 2011, University of Texas at Austin)
jorge.a.acosta@rice.edu

DISTINGUISHED VISITORS AND VISITING SCHOLARS

Mathematicians frequently visit Rice University. The mathematics department typically hosts one or two postdoctoral or other long-period faculty visitors who interact with Rice faculty and graduate students. A weekly colloquium and several seminars also provide the opportunity to meet many different mathematicians actively engaged in current research. Events are displayed at: www.math.rice.edu/cgi-pub/seminar/calendar.

ABOUT RICE AND HOUSTON

Rice is a leading American research university—small, private and highly selective—distinguished by a collaborative, interdisciplinary culture and a global perspective. Only a few miles from downtown Houston, it occupies an architecturally distinctive, 285-acre campus shaded by nearly 4,000 trees. State-of-the-art facilities and laboratories, internationally renowned centers and institutes and one of the country's largest endowments support an ideal learning and living environment.

The university attracts a diverse group of highly talented students and faculty with outstanding graduate and professional programs in the humanities, social sciences, natural sciences, engineering, architecture, music and business. With just 2,374 graduate students and 3,708 undergraduates, it offers an unusual opportunity to forge close relationships with eminent faculty scholars and researchers and the option to tailor graduate programs to specific interests.

Houston offers all the expected educational, cultural and commercial advantages of a large urban center, and more. It's home of the Texas Medical Center, the largest concentration of medical schools,



hospitals and research facilities in the world, as well as several other universities. Rice has cooperative programs with the University of Houston, Baylor College of Medicine, the University of Texas Health Science Center. Houston is one of the few U.S. cities with resident companies in all four major performing arts—drama, ballet, opera and symphony. It also boasts a museum district featuring exhibits of national and international prominence.

As urban as it is, Houston also is a surprisingly green city. Houstonians enjoy the outdoors in more than 300 municipal parks and 120 open spaces, and many frequent the beach at Galveston Island, only a 45-minute drive away. Other short trips include Austin, the state's capital, and historic San Antonio, both of which are a little more than three hours away.

CAMPUS VISIT

We encourage you to visit Rice at any time for a firsthand look at the department and the beautiful, tree-lined campus near the heart of historic Houston. If you apply and are admitted, you will be invited to visit the campus later at departmental expense. During your time here, you will not only visit with faculty, but usually you'll be hosted by current graduate students from whom you can learn more about graduate life and lifestyles in Houston. In the meantime, feel free to contact any of the graduate students listed at the end of this publication with any questions you may have about the department or the university.

ADMISSION

The mathematics graduate committee attempts to evaluate the potential of each applicant to obtain a Ph.D. in mathematics. The evaluation is based primarily on college and university transcripts, letters of recommendation and the Graduate Record Examination. Entering graduate students are expected to have a bachelor's degree (or equivalent) in mathematics or a mathematically related field.

FINANCIAL ASSISTANCE

Tuition waivers are provided to most students entering the Rice graduate program in mathematics as part of the fellowship package. Also, after completing six semesters in a Ph.D. program, students are charged reduced tuition of approximately 5.5% of the full cost. Students who enroll with fellowships and research assistantships receive a tuition waiver plus a stipend for 11 months. Another benefit to graduate students in mathematics is the opportunity to travel occasionally to national and international mathematics conferences at departmental expense.

HOW TO APPLY

Application materials can be obtained by downloading from: <https://mathgradapps.rice.edu/index.cfm>
The deadline for completed applications is Jan. 1, 2015.

For inquiries regarding the GRE or TOEFL exams, contact:
www.ets.org

FOR MORE INFORMATION:

Rice University homepage:
www.rice.edu

Rice University Office of Graduate and Postdoctoral Studies homepage:
graduate.rice.edu

Graduate Student Association homepage:
gsa.rice.edu

City of Houston homepage:
www.houstontx.gov

Houston information from the *Houston Chronicle*:
www.chron.com

Houston information from the Greater Houston Partnership:
www.houston.org

Houston information from Citysearch:
houston.citysearch.com

