Dana Carolyn Paquin
Curriculum Vitae

Current Affiliation

Assistant Professor of Mathematics
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Personal Information

Date of birth: September 23, 1980
Citizenship: USA

Education

2007 **Ph.D., Mathematics**, Stanford University, Stanford, CA, June 2007.
Advisor: Prof. Doron Levy, Department of Mathematics, Stanford University.
Thesis: Multiscale methods for image registration.

2002 **B.S., Mathematics** (Magna Cum Laude), Davidson College, Davidson, NC.
Advisor: Prof. Benjamin Klein.

2002 **Budapest Semesters in Mathematics**, Budapest, Hungary.

1998 **North Carolina School of Science and Mathematics**, Durham, NC. Residential high school for academically gifted juniors and seniors with strong focus on mathematics and science.

Research Interests

Applied Mathematics, Mathematical Modeling, Mathematical Biology, Medical Imaging, Image Processing, Numerical Analysis, Partial Differential Equations, Applications to Physics, Biology, Medical Sciences, and Engineering.

Conference and Seminar Lectures and Presentations

1. Stanford University Department of Radiation Oncology and Radiation Physics, Stanford University Medical Center, *April 2006*.
2. Society for Industrial and Applied Mathematics (SIAM) Conference on Imaging Science, Minneapolis, *May 2006*.
3. Biomedical Computation at Stanford Symposium, Stanford, *October 2006*.
4. American Society for Therapeutic Radiology and Oncology (ASTRO) Annual Meeting, Philadelphia, *November 2006*.
5. Numerical Methods for Degenerate Elliptic Equations and Applications, Banff International Research Station for Mathematical Innovation and Discovery, *December 2006*.
6. Joint Mathematics Meetings, New Orleans, *January 2007*.
7. Stanford 50: State of the Art and Future Directions of Computational Mathematics and Numerical Computing, *March 2007*.
8. Innovations in Undergraduate Science Education: Modeling and Computational Science in Biology and Chemistry, Kenyon College, *November 2007*.

Teaching

1. I am currently teaching the following courses at Kenyon College.
   - **Linear Algebra**, Fall 2007. Topics include linear systems, matrix theory, dimension, rank, linear transformations, vector spaces, determinants, eigenvalues and eigenvectors, orthogonality, change of basis, and applications.
   - **Mathematical Models**, Fall 2007. Topics include optimization models, continuous and discrete dynamical system models, graph theory, probability models, stochastic models, and preparation for the COMAP Mathematical Contest in Modeling.
   - I have developed an evening **Problem-Solving Seminar** at Kenyon College, with the goal of preparing students for the Putnam Competition in Mathematics. Topics include induction, the pigeon-hole principle, modular arithmetic, number theory, combinatorics, integrals, analysis, calculus, and general problem-solving techniques.
   - **Calculus B: Integral Calculus**, Spring 2008. Topics include the fundamental ideas of integral calculus, techniques of integration, numerical methods, applications of integration, separable differential equations, Euler's method, slope fields, improper integrals, sequences, series, and Taylor series.

- **Differential Equations**, Spring 2008.

2. I was a **Teaching Assistant** for the following courses at Stanford University. As a Teaching Assistant, I led recitation sessions designed to reinforce and clarify course content. I also held office hours, problem sessions, and exam review sessions, and assisted in grading exams.

   - **Calculus ACE (Math 42 ACE)**, Autumn 2006. Accelerated Calculus for Engineers. This course covers the same topics as Math 42 (see below), but is designed specifically for under-represented groups and minorities in engineering and other math-based fields. Students spend an extra two hours per week in recitation section in an effort to develop effective problem-solving and analytical skills. I was selected to teach this course (joint appointment with Mathematics and Engineering) based on my teaching evaluations and teaching philosophies. One of the primary goals of this course is to increase diversity in mathematics and engineering.
   - **Calculus (Math 42)**, Autumn 2003, Winter 2005, Winter 2006. Topics: methods of symbolic and numerical integration, applications of the definite integral, introduction to differential equations, infinite series.

3. I was a **Course Assistant** for the following courses at Stanford University. As a Course Assistant, I led office hours, problem sessions, and exam review sessions. I also assisted in developing and grading exams and maintaining course websites.

   - **Mathematical Finance (Math 238/Stats 250)**, Winter 2007. Graduate course in Mathematical Finance and Stochastic Calculus. Topics: stochastic models of financial markets, forward and futures contracts, European options and equivalent martingale measures, hedging strategies and management of risk, term structure models and interest rate derivatives, optimal stopping, American options.
   - **Numerical Analysis (Math 118)**, Autumn 2005. Topics: iterative methods for nonlinear equations, topics from numerical linear algebra, interpolation theory, splines, approximation of functions, numerical differentiation and integration.
   - **Introduction to Combinatorics and Its Applications (Math 108)**, Autumn 2004. Topics: graphs, trees (Cayley's Theorem, applications to phylogeny), eigenvalues, basic enumeration (permutations, Stirling and Bell numbers), recurrences, generating functions, basic asymptotics.
   - **Modern Algebra (Math 210B)**, Winter 2004. Graduate course in Algebra. Topics: Galois theory, ideal theory, algebraic geometry, algebraic number theory.
   - **Linear Algebra and Matrix Theory (Math 113)**, Winter 2003. Topics: algebraic properties of matrices and their interpretation in geometric terms, linear equations, vector spaces, linear dependence, bases and coordinate systems, linear transformations and matrices, similarity, eigenvectors and eigenvalues, diagonalization.

- **Functions of a Real Variable (Math 115)**, Autumn 2002. Topics: the development of real analysis in Euclidean space: sequences and series, limits, continuous functions, derivatives, integrals, point set topology. This is a course for honors mathematics majors and students who intend to do graduate work in mathematics.

4. **Head mathematics instructor**, Flex College Prep, Cupertino, September 2002-Present. Developed and taught several mathematics courses for advanced high-school students. Developed and taught mathematics test-preparation workshops for SAT Mathematics, AP Calculus, and AP Statistics. Wrote lecture notes that serve as the textbooks for AP Calculus and SAT Mathematics courses. Developed teaching curriculum for other mathematics instructors and managed mathematics course offerings and structure.

Awards

2007 **George Pólya Teaching Fellow Award**, Stanford University. Award for outstanding teaching.

2002-2007 **Course and Research Assistantships** and **Teaching Fellowships**, Stanford University. Research Assistantships funded in part through the National Science Foundation and the National Institutes of Health.

1998-2002 **John Montgomery Belk Scholarship**, Davidson College. Comprehensive four-year merit scholarship for students who combine outstanding academic ability with superior accomplishments in leadership, service, and athletics.

1998-2002 **Robert C. Byrd Honors Scholarship**. Merit scholarship for outstanding high school seniors.

2001 **Horizons Women in Defense Award**. Award for women who demonstrate leadership potential that can lead to contributions in science, engineering, and business disciplines.

2001 **Universities Space Research Association Award**, Award for outstanding scientific space research that I conducted through a *Research Experiences for Undergraduates* appointment in Astrophysics at North Carolina State University. Research on convective instability in core-collapse supernovae.

1998 **NSA/COMAP Mathematical Contest in Modeling**. Named Honorable Mention. One of only eight high school teams among over 500 international four-year institutions.

Professional Associations and Service

- I am a national **Project NExT (New Experiences in Teaching)** fellow. Project NExT is a professional development program designed to improve the teaching and learning of mathematics, and to address issues regarding research, scholarship, and professional activities.
- American Mathematical Society (AMS)
- Society for Industrial and Applied Mathematics (SIAM)
- Association for Women in Mathematics (AWM)
- Mathematical Association of America (MAA)
- Society for Mathematical Biology
- Member of the MAA Committee on Section Activities of the Ohio Section (CONSACT)
- Stanford University Women in Science and Engineering Group
- Phi Beta Kappa Honor Society

Publications

1. D. Paquin, E. Schreibmann, L. Xing, *Image Registration with Auto-Mapped Control Volumes*, International Journal of Radiation, Oncology, Biology, Physics Proceedings of the 47th Annual Meeting of the American Society for Therapeutic Radiology and Oncology, Volume 63, Supplement S, October 2005.
2. D. Paquin, D. Levy, E. Schreibmann, and L. Xing, *Multiscale Image Registration*, Mathematical Biosciences and Engineering, Volume 3, Number 2, April 2006.
3. D. Paquin, D. Levy, and L. Xing, *Multiscale Image Registration*, International Journal of Radiation, Oncology, Biology, Physics Proceedings of the 48th Annual Meeting of the American Society for Therapeutic Radiology and Oncology, Volume 66, Issue 3, Supplement S, November 2006.

4. S. Kamath, E. Schreibmann, D. Levy, D. Paquin, and L. Xing, *Improving the Convergence and Computational Efficiency of Deformable Image Registration Calculation by Incorporating Prior Knowledge*, International Journal of Radiation, Oncology, Biology, Physics Proceedings of the 48th Annual Meeting of the American Society for Therapeutic Radiology and Oncology, Volume 66, Issue 3, Supplement S, November 2006.

5. D. Paquin, D. Levy, and L. Xing, *Hybrid Multiscale Landmark and Deformable Registration*, Mathematical Biosciences and Engineering, Volume 4, Number 4, October 2007.

6. Y. Xie, L. Xing, D. Paquin, D. Levy, and T. Yang, *Deformable Image Registration With Inclusion of Auto-Detected Homologous Tissue Features*, International Journal of Radiation, Oncology, Biology, Physics Proceedings of the 49th Annual Meeting of the American Society for Therapeutic Radiology and Oncology, Volume 69, Issue 3, Supplement S, November 2007.

7. D. Paquin, D. Levy, and L. Xing, *Multiscale Deformable Registration of Noisy Medical Images*, Mathematical Biosciences and Engineering, Volume 5, Number 1, January 2008.