

Curriculum Vitae
Juan A. Gatica
August 26, 2002

Personal Data:

Born October 16, 1945 in Temuco, Cautín, Chile

Visa Status: Permanent resident of the United States

Education:

Licenciado en Matemática, Universidad de Concepción, Chile, 1969, Ph.D., University of Iowa, 1972.

Current Position:

Professor of Mathematics and Director of the Mathematics Tutorial Laboratory, University of Iowa.

Professional Experience:

1. Instructor, Universidad de Concepción, 1968-1971.
2. Instructor, University of Iowa, 1971-72.
3. Profesor Asistente, Universidad de Concepción, 1972-73.
4. Profesor Titular, Universidad de Concepción, 1973-78.
5. Profesor Titular, Universidad Técnica del Estado, Santiago, Chile (now Universidad de Santiago), 1974-78.
6. Visiting Assistant Professor, University of Iowa, 1975-78.
7. Assistant Professor, University of Iowa, 1978-79.
8. Associate Professor, University of Iowa, 1979-1990.
9. Visiting Associate professor, Emory University, 1986-88.
10. Professor, University of Iowa, 1990-Present.
11. Director of the Mathematics Tutorial Laboratory, University of Iowa, June 200-Present.

Areas of Technical Interest: Differential Equations, Functional Analysis, and Applications to Biology.

Professional Memberships: American Mathematical Society, American Association for the Advancement of Science.

Research Publications:

1. Fixed point theorems for Lipschitzian pseudo-contractive mappings, Proc. A. M. S. 36 (1972), 111-115 (with W. A. Kirk).
2. Fixed points for contraction mappings with applications to nonexpansive and pseudo-contractive mappings, Rocky Mountain J. of Math., 4 (1974), 69-79 (with W. A. Kirk).

3. Fixed point theorems for k -set contractions defined in a cone, *Pacific J. of Math.* 53, (1974), 131-136 (with W. A. Kirk).
4. Fixed point theorems for k -set contractions and pseudo-contractive mappings, *J. M. A. A.*, 46 (1974), 555-564.
5. Fixed point theorems in a cone with applications, *J. M. A. A.*, 61 (1976) (with Hal L. Smith).
6. A singular functional differential equation arising in an immunological model, *Proc. Of the Conference on the Theory of Ordinary and Partial differential Equations*, 1976, Springer-Verlag Lecture notes in Mathematics, Vol. 564 (with Paul Waltman).
7. A threshold model simulating the humoral immune response to a replicating antigen, *Math. Biosciences*, 37 (1977) 113-134 (with H. I. Freedman).
8. On the boundedness of lymphocytes in deterministic threshold models of humoral immune response, *Rocky mountain J. of Math.* 9 (1979), 73-81 (with H. I. Freedman).
9. Fixed-point theorems for mappings in ordered Banach spaces, *J. M. A. A.*, 71 (1979), 547-557 (with N. P. Cac).
10. A threshold model of antigen-antibody dynamics, *Proceedings of the 1978 IEEE Conference on Decision and Control*, 746-749 (with Paul Waltman).
11. A threshold model of antigen-antibody dynamics with fading memory, *Proceedings of the International Conference on Nonlinear Analysis*, V. Lakshmikantham, Editor, Academic Press (1982), 425-439 (with Paul Waltman).
12. Existence and uniqueness of solutions of a functional differential equation modeling thresholds, *Journal of Nonlinear Analysis*, T. M. A., 8 (1974), 1215-1222 (with Paul Waltman).
13. Predator-prey models with almost periodic coefficients, *Applicable Analysis* 27 (1988), 143-152 (with Joseph W. H. So).
14. A system of functional differential equations modeling threshold phenomena, *Applicable Analysis* 28 (1988), 39-50 (with Paul Waltman)
15. Singular nonlinear boundary value problems for second order differential equations, *J. D. E.* 79 (1989), 62-78 (with V. Olikier and Paul Waltman).
16. Iterative procedures for nonlinear second order boundary value problems, *Annali di Matematica Pura ed Applicata*, (IV) (CHLV) (1990), 1-25 (with V. Olikier and Paul Waltman).
17. Radially symmetric solutions of a class of singular elliptic equations, *Proc. Edinburgh Math. Soc.* 33 (1990), 169-180 (with Gastón Hernández and Paul Waltman).
18. Positive almost periodic solutions of some delay integral equations, *J. D. E.*, 83 (1990), 166-178 (with A. M. Fink).
19. For every answer there are two questions, *Mathematics Magazine* 65 (1992), 182-185 (with A. M. Fink).
20. Approximation of solutions of singular second order boundary value problems, *SIAM J. Math. Anal.* , 2 (1991), 440-462 (with Gastón E. Hernández and Paul Waltman).

21. Qualitative behavior of solutions of some state dependent delay equations, *Delay and Differential Equations, Proceedings in Honor of George Seifert on his Retirement*, World scientific (1992), 35-56 (with Jesus Rivero).
22. Eigenvalues of generalized Gelfand problems, *Journal of Nonlinear Analysis*, T. M. A. 20 (1993), 1453-1468 (with A. M. Fink and Gastón E. Hernández).
23. Positive solutions of systems of second order boundary value problems, *J. M. A. A.* 180 (1993), 93-108 (with A. M. Fink).
24. Nonnegative solutions to the radial Laplacian with nonlinearity that changes sign, *Proc. A. M. S.*, 123 (1995), 1393-1398 (with N. P. Cac and A. M. Fink).
25. Nonnegative solutions of quasilinear elliptic problems with nonnegative coefficients, *J. M. A. A.* 206 (1997), 1-9 (with N. P. Cac and A. M. Fink).
26. Positive solutions of semilinear problems with coefficients that change sign, *J. Nonlinear analysis* 37 (1999), 501-510 (with N. P. Cac and Y. Li).
27. Fixed point theorems with applications to differential equations, *Cubo Matemática Educacional*, 2 (2000) 195-207.

Books.

1. *Variable Compleja*, Cuadernos del LAM, Santiago, Chile, 1975.
2. *Introducción a la integral de Lebesgue en la recta*, Programa de Monografías Científicas, Organización de Estados Americanos, 1977
3. *Mathematics for the Biological Sciences* Kendall-Hunt, 2002.

Research in progress.

1. A fixed-point theorem in Fréchet spaces, with applications, in preparation (with Rudolph Schmid).
2. Behavior of solutions of state-dependent delay equations.
3. A state dependent model for the immune response to a replicating antigen (with Eduardo Muñoz).

Books in preparation.

1. *Ordinary differential equations*.
2. *Calculus and Matrix Algebra for Business*, contracted and submitted to Kendall/Hunt.

Presentations: 1981-2002

1. Tenth Midwest Conference on differential Equations, North Dakota State University, October 1981, "On a singular differential equation".
2. First US-Chile International Conference on Nonlinear Analysis and differential Equations, Santiago, Chile, April 1985, "Existence and uniqueness of solutions to singular systems of functional differential equations".
3. Dixieland Analysis Seminar, Emory University, May 1987, "Iterative procedures for nonlinear second order boundary value problems".
4. Auburn University, February 1988, Colloquium, "Positive solutions to singular second order differential equations".
5. Wake Forest University, May 1988, Colloquium, "Positive solutions to singular second order ordinary differential equations".

6. University of Alberta, June 1988, Colloquium, "Positive solutions to singular second order ordinary differential equations".
7. University of Connecticut, Storrs, March 1989, Colloquium, "Positive solutions to singular second order ordinary differential equations".
8. International Conference on Differential Equation: Theory and Applications in Stability and Control, Colorado Springs, June 1989, "Approximation of solutions of singular second order boundary value problems".
9. Universidad de la Frontera, Temuco, Chile, November 1989, Colloquium, "Radially symmetric solutions of semilinear elliptic boundary value problems".
10. III Simposio Chileno de Matemática, Concepción, Chile, November 1989, "Positive almost periodic solutions of some delay integral equations".
11. Facultad de Ciencias, Universidad de Chile, Santiago, June 1990, Colloquium, "Positive solutions of systems of boundary value problems".
12. Seifert Conference, Iowa State University, Ames, Iowa, October 1991, "Qualitative behavior of solutions of some state dependent delay equations".
13. Special session on differential equations, Dayton Meeting of the A. M. S., October 1992, "Positive solutions of quasilinear elliptic boundary value problems with nonnegative coefficients".
14. Georgia Institute of Technology, February 1993, Colloquium, "Nonnegative solutions of quasilinear elliptic boundary value problems".
15. Emory University, February 1993, Colloquium, "Nonnegative solutions of quasilinear elliptic boundary value problems".
16. Lakeland College, October 1993, Colloquium, "Teaching Calculus with the aid of MAPLE".
17. MichMATYC 1993, Oakland Community College, Auburn Mills, Michigan, "Teaching Calculus with the aid of MAPLE".
18. Joint Mathematics Meeting, Cincinnati, Ohio, January 1994 "Radially symmetric solutions of generalized Gelfand problems".
19. OhioMATYC Conference, Cincinnati, Ohio, February 1994, "How MAPLE can be used to teach Calculus".
20. University of Missouri, Rolla, March 1994, Colloquium, "Nonnegative solutions of some quasilinear elliptic boundary value problems".
21. Universidad de la Frontera, Temuco, Chile, August 1994, Colloquium, "Using MAPLE as an aid in the teaching of Calculus".
22. Universidad de Concepción, Chile, August 1994, Colloquium, "Some aspects of nonlinear functional analysis and applications to differential equations".
23. Colloquium Mathematicae Valparadisi, September 1994, "Nonnegative solutions of quasilinear elliptic boundary value problems with nonnegative coefficients".
24. Colloquium Mathematicae Valparadisi, September 1994, "Using MAPLE as an aid in the teaching of Calculus".
25. Santiago College, Chile, Colloquium, "Using technology as an aid in the teaching of mathematics".
26. Facultad de Ciencias, Universidad de Chile, Santiago, September 1994, "Nonnegative solutions of quasilinear elliptic boundary value problems with coefficients that change sign".

27. Facultad de Ciencias, Universidad de Chile, Santiago, September 1994, "Using MAPLE as an aid in the teaching of Calculus".
28. Facultad de Ciencias Físicas y Matemáticas, Universidad de Chile, Santiago, September 1994, Colloquium, "What an average adult will need to know in mathematics in the near future".
29. Universidad de Concepción, October 1994, Seminar, "Nonlinear functional analysis and applications".
30. Universidad de Concepción, October 1994, Seminar, "Teaching differential equations with the aid of MAPLE".
31. Universidad de Puerto Rico, Mayagüez, March 1999, Colloquium, "Fixed point theorems and their applications to differential equations".
32. Universidad de Puerto Rico, Cayey, March 1999, Colloquium, "Fixed point theorems and their applications to differential equations".
33. XV SIDIM, Universidad de Puerto Rico, Mayagüez, February 2000, "Cálculo para las ciencias biológicas".
34. XV SIDIM, Universidad de Puerto Rico, Mayagüez, February 2000, "Problemas de valores de Frontera para ecuaciones elípticas semilineales".
35. XVI SIDIM, Universidad de Puerto Rico, Humacao, February 2001, "State dependent functional differential equations".

Editorships.

Associate Editor, Cubo Matemática Educacional, Universidad de la Frontera, Chile.

Conferences Organized.

1. Midwest Conference on Differential Equations, September 1993.
2. Midwest Conference on Differential Equations, December 1992.

Professional Service.

1. Referee for Proc. A. M. S., J. M. A. A., SIAM J. Math. An., Proc. Edinburgh Math Soc., Journal of Nonlinear Analysis, T. M. A., J. D. E., Proceedings, Academia Sinica, Rocky Mountain Journal of Mathematics.
2. Reviewer for Math. Reviews.
3. Referee for grants from N. S. F., CONICYT, FONDECIT.
4. Book reviewing.
5. Editor (with Hal L. Smith) of a special issue of the Rocky Mountain Journal of Mathematics.
6. External member, Ph. D. Comprehensive Committee and later Thesis Defense Committee for Alin Carsteanu, University of Minnesota.

Departmental Committees.

1. Undergraduate Committee (1998-2000).
2. Salary Committee (1992-93?), when it still existed).
3. Hiring Committee (several times).
4. Graduate Committee (several times, including a term starting in 2001)
5. Hiring Plan Committee.
6. Advisory Committee.

7. Visiting Speaker Committee
8. T. A. Selection Committee.
9. Executive Committee (198-2000).
10. Coordinator for 22M: 1,2,3,4,5,9,
11. Committee for Minority Graduate Student Recruitment and Development.

University Committees.

1. External Review Committee, Department of Mechanical Engineering (1984).
2. Foreign Student Committee.
3. Faculty Assembly.
4. Secretary of the Faculty Assembly (1992-93).

Courses Taught.

1. Basic Algebra.
2. Finite Mathematics.
3. Introduction to Calculus.
4. Mathematics for the biological sciences.
5. Calculus for the biological sciences.
6. Calculus 1, 2, 3.
7. Engineering calculus (all courses).
8. Calculus and matrix algebra for business.
9. Introduction to ordinary differential equations.
10. Intermediate differential equations.
11. Theory of ordinary differential equations.
12. Advanced topics in ordinary differential equations.
13. Real analysis.
14. Complex variables.
15. Measure theory.
16. Functional analysis.
17. Topics in complex variables (entire functions).
18. Partial differential equations.
19. Topology.
20. Theory of algorithms.

Contributions to Teaching.

1. Member of team that organized the teaching of a remedial course (22M:001) in large lecture format (1978).
2. Reorganized 22M:001 for teaching in small sections by Teaching Assistants (1992).
3. Guided two honors projects (1993-95).
4. Restructured and was directing the selection of textbooks for our mathematics for biology sequence, coordinating with the Department of Biology (1997-2000).
5. Introduced a short seminar for entering graduate students with non-traditional background (with P. Kutzko and E. Madison, 1998-2000).
6. Conduct weekly training sessions for TA's that are working for the Math. Lab. during their first year.

7. Conduct a Summer TA Preparation Seminar.

Ph. D. Committees.

I have been in many of these over the years, the last ones being for Eric Smith in July 2001, Jaehoon Seol in July 2002.

Ph. D. Thesis Directed.

William M. Smith, An extension of cone techniques to wedges with applications to biological models, 1981.

Administration.

I have been director of the Mathematics Tutorial Laboratory since June 2000, and have worked training the staff, maintaining an informative Web Page and increased the number of computers and software available.