

## **CURRICULUM VITAE OF GLENN F. WEBB – July, 2018**

### **EDUCATION**

1965 B.S. in Applied Mathematics, Georgia Institute of Technology

1966 M.S. in Mathematics, Emory University

1965-1968 NASA Fellowship, Emory University

1968 Ph.D. in Mathematics, Emory University

### **PROFESSIONAL EXPERIENCE**

1968-1973 Assistant Professor of Mathematics, Vanderbilt University

1973 (Fall) Visiting Associate Professor of Mathematics, University of Kentucky

1973 Associate Professor of Mathematics, Vanderbilt University

1974 Research Fellowship for Foreign Mathematicians, Consiglio Nazionale delle Ricerche di Italia, Istituto Matematico, Università di Roma, Rome, Italy

1979 Professor of Mathematics, Vanderbilt University

1980 (May, June) Visiting Professor of Mathematics, Università di Padova, Padua, Italy

1981 (May, June) Visiting Professor of Mathematics, Universität Graz, Graz, Austria

1982 (May, June) Visiting Professor of Mathematics, Scuola Normale Superiore, Pisa, Italy

1987-1993 Chair of the Mathematics Department, Vanderbilt University

1996 (May, June) Visiting Professor of Mathematics, Università di Padova, Padua, Italy

1998 (May) Visiting Professor of Mathematics, Università di Padova, Padua, Italy

2000 (May) Visiting Professor of Mathematics, Università di Padova, Padua, Italy

2009 (March-April) Visiting Professor of Mathematics, University of Bordeaux, Bordeaux, France

2010 (June) Visiting Professor of Mathematics, University of Bordeaux, Bordeaux, France

2011 (June) Visiting Professor of Mathematics, University of Lyon, Lyon, France

### **HONORS**

2012 Fellow of the American Mathematical Society

## **PROFESSIONAL ORGANIZATIONS**

American Mathematics Society

Mathematical Association of America

Society of Mathematical Biology

Society of Industrial and Applied Mathematics

## **EDITORIAL BOARDS**

Differential and Integral Equations

Discrete and Continuous Dynamic Systems

Nonlinear Studies

Communications in Applied Analysis

Communications on Applied Nonlinear Analysis

Journal of Evolution Equations

Mathematical Biosciences and Engineering

## **THESES SUPERVISION:**

Chi-lin Yen, Ph.D., 1971

William E. Fitzgibbon, III, Ph.D., 1972

Yen Tzu Fu, Ph.D., 1975

Arnold Dean, Ph.D., 1980

Thomas H. Barr, Ph.D., 1984

Chuan Jen Chyan, Ph.D., 1985

Gary Hall, Ph.D., 1989

Bernd Rossa, Ph.D., 1991

Michael Johnson, Ph.D., 1998

Keith Howard, Ph.D., 2000

Amy Lin, Ph.D., 2001

Meredith Greer, Ph.D., 2002

Karen O'Hara, Ph.D., 2002

Yan Zhao, Ph.D., 2005

Peter Hinow, Ph.D., 2007

Hannah Callender, Ph.D., 2007

Georgi Kapitanov, Ph.D., 2012

Xi Huo, Ph.D., 2014

Gao Min, Ph.D., 2015

## PUBLICATION LIST

- [1] Representation of nonlinear nonexpansive semi-groups of transformations in Banach spaces, *J. Math. Mech.* 19 (1969), 159-170.
- [2] Nonlinear evolution equations and product integration in Banach spaces, *Trans. Amer. Math. Soc.* 148(1970), 273-282.
- [3] Product integral representation of time dependent nonlinear evolution equations in Banach spaces. *Pacific J. Math.* 32 (1970).
- [4] Nonlinear evolution equations and product stable operator on Banach spaces, *Trans. Amer. Math. Soc.* 148(1970), 409- 426.
- [5] Continuous nonlinear perturbations of linear accretive operators in Banach spaces, *J. Functional Analysis* 10(1972), 191-201.
- [6] Dual spaces of spaces of quasi-continuous functions, *Mathematische Nachrichten* 55(1973), 309-323.
- [7] Nonlinear perturbation of linear accretive operators in Banach spaces, *Israel J. Math.* 12(1972), 237-248.
- [8] Accretive operators and existence for nonlinear functional differential equations, *J. Differential Equations* 14(1973), 57-69.
- [9] Autonomous nonlinear functional differential equations and nonlinear semigroups, *J. Math. Anal. Appl.* 46(1974), 1-12.
- [10] Abstract scattering for nonlinear evolution equations, *Math. Systems Theory* 8(1975), 347-352.
- [11] An application of accretive operator theory to a nonlinear complex heat equation, *Bollettino dell Unione Matematica Italiana* 11(1975), 604-609.
- [12] (with H. Riedl) Relative boundedness conditions and the perturbation of nonlinear operators, *Czechoslovak Math. J.* 24(1974), 395-418.

- [13] (with C. Travis) Existence and stability for partial functional differential equations, *Trans. Amer. Math. Soc.* 200(1974), 395-418.
- [14] Asymptotic stability for abstract nonlinear functional differential equations, *Proc. Amer. Math. Soc.* 54(1976), 71-89.
- [15] Functional differential equations and nonlinear semigroups in LP spaces, *J. Differential Equations* 20(1976), 71-89.
- [16] (with C. Travis) Partial differential equations with deviating arguments in the time variable, *J. Math. Anal. Appl.* 56(1976) 397-409.
- [17] Linear functional differential equations with  $L^2$  initial functions, *Funkcialaj Ekvacioj.* 19(1976), 65-77.
- [18] (with G. Reddien) Boundary value problems for functional differential equations with  $L^2$  initial functions, *Trans. Amer. Math. Soc.* 223(1976), 305-321.
- [19] (with C. Travis) Existence and stability for partial functional differential equations, *Dynamical Systems, Vol. 2 International Symposium*, Academic Press, New York, 1976, 147-151.
- [20] Regularity of solutions to an abstract inhomogeneous linear differential equations, *Proc. Amer. Math. Soc.* 62(1977), 272-277.
- [21] Exponential representation of solutions to an abstract semi-linear differential equations, *Pacific J. Math.* 70(1977), 269-279.
- [22] Asymptotic stability in the  $\alpha$ -norm for an abstract nonlinear Volterra integral equation, *Stability of Dynamical Systems, Theory and Applications, Vol. 28, Lecture Notes in Pure and Applied Mathematics*, Marcel Dekker, New York, 1977, 207-211.
- [23] Volterra integral equations and nonlinear semigroups, *Nonl. Anal. Theory Math. Appl.* 1(1977), 415-427.
- [24] Volterra integral equations as functional differential equations on infinite intervals, *Hiroshima Math. J.* 7(1977), 61-70.
- [25] (with C. Travis) Compactness, regularity, and uniform continuity properties of strongly continuous cosine families, *Houston J. Math.* 3(1977), 555-567.
- [26] (with C. Travis) Existence, stability, and compactness in the  $\alpha$ -norm for partial functional differential equations, *Trans. Amer. Math. Soc.* 240(1978), 129-143.
- [27] (with C. Travis) Cosine families and abstract nonlinear second order differential equations, *Acta Mathematica* 32(3-4) (1978), 75-96.
- [28] An abstract semilinear Volterra integrodifferential equation, *Proc. Amer. Math. Soc.* 60 (1978), 255-260.
- [29] (with G. Reddien) Numerical approximation of nonlinear functional differential equations with  $L^2$  initial functions, *SIAM J. Math. Anal.* 9(1978), No. 6, 1151-1171.
- [30] (with C. Travis) An abstract second order semilinear Volterra integrodifferential equation, *SIAM J. Math. Anal.* 10(1979), No. 2, 412-424.
- [31] (with C. Travis) Perturbations of strongly continuous cosine family generators, *Colloquium Mathematicum* Vol. XLV (1981), 277-285.
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- [179] (with P. Magal) The parameter identification problem for SIR epidemic models: Identifying unreported cases, accepted for publication in *J. Math. Biol.*

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- [181] (with P. Magal and O. Seydi) Final size of a multi-group SIR epidemic model: Irreducible and non-irreducible modes of transmission, *Math. Biosciences*, Vol. 301 (2018), 59-67.
- [182] (with P. Magal and Y. Wu) On a Vector-host Epidemic Model with Spatial Structure, accepted for publication in *Nonlinearity* (2018).
- [183] (with P. Magal and Y. Wu) Spatial spread of epidemic diseases in geographical settings: Seasonal influenza epidemics in Puerto Rico, submitted for publication.
- [184] (with P. Magal and Y. Wu) On the basic reproduction number of reaction-diffusion epidemic models, submitted for publication.
- [185] (with A. Ducrot, P. Magal, and T. Nguyen) Identifying the number of unreported cases in SIR epidemic models (submitted for publication).
- [186] (with P. Magal, A. Noussair, and Y. Wu) Modeling epidemic outbreaks in geographical regions: Seasonal influenza in Puerto Rico (submitted for publication).

## RESEARCH MONOGRAPH

*Theory of Nonlinear Age-Dependent Population Dynamics*, Monographs and Textbooks in Pure and Applied Mathematics Series Vol. 89, Marcel Dekker, Inc., 1985.

## CONFERENCE PROCEEDINGS

*Recent Advances in Wavelet Analysis* (co-editor with Larry L. Schumaker), Academic Press, 1994.

*Mathematical Models in Medical and Health Science* (co-editor with Mary Ann Horn and Gieri Simonett), Innovations in Applied Mathematics Series, Vanderbilt University Press, 1999.

*Mathematical Models in Cancer* (co-editor with Mary Ann Horn), Proceedings of the Workshop on Mathematical Models in Cancer, Vanderbilt University, May 3-5, 2002, Special Issue of *Discrete and Continuous Dynamical Systems*, Vol.4, No.1, 2004.

*Advances in Mathematical Biology* (co-editor with Lansun Chen, Yang Kuang, and Shigui Ruan), Proceedings of the Third International Conference on Mathematical Biology, Satellite Meeting of the International Congress of Mathematicians, Guilin, China, August 15-18, 2002, Special Issue of *Discrete and Continuous Dynamical Systems*, Vol.4, No.3, 2004.

*Mathematical Biosciences and Engineering*, Vol. 7, No. 1, January 2010, A Special Issue on Tribute to Horst R. Thieme on the Occasion of his 60<sup>th</sup> Birthday, (co-editor with Zhilan Feng, Yuang Kuang, and Hal Smith).

*Mathematical Modeling in the Medical Sciences, Mathematical Modelling of Natural Phenomena*, Vol. 5 No. 3, April 28, 2010, Proceedings of the 24<sup>th</sup> Annual Shanks Lecture, Vanderbilt University, May 18-21, 2009 (co-editor with

Alkram Aldroubi, Phillip Crooke, and Joanna Pressley).

## CONFERENCES

1. Conference on Equations of Evolution of Nonlinear Semigroups, University of Kentucky, May 29-31, 1969.
2. Conference on Evolution Equations and Functional Analysis, University of Kansas, June 29-July 18, 1970 (invited speaker).
3. Symposium on General Analysis, Arkansas State University, April 28-29, 1972.
4. Centro Internazionale Matematico Estivo Conference on Analysis, Bressanone, Italy, June 2-10, 1974.
5. Science Research Council of the United Kingdom Conference on Functional Analysis and Differential Equations, University of London, Chelsea, April 1974.
6. Sixth John H. Barrett Memorial Lecture Series, University of Tennessee, April 24-26, 1975 (invited speaker)
7. National Science Foundation Regional Conference on Stability of Dynamical Systems, Mississippi State University, August 11-15, 1975 (invited speaker).
8. National Science Foundation Regional Conference on Nonlinear Diffusion, University of Houston, June 28 - July 2, 1976.
9. Conference on Nonlinear Systems and Applications to Life and Physical Sciences, University of Texas at Arlington, Arlington, Texas, July 19-23, 1976 (invited speaker).
10. Midwest Regional Conference on Differential and Integral Equations, University of Southern Illinois at Carbondale, October 8-9, 1976 (invited speaker).
11. Conference on Functional Differential Equations, Brown University, May 19-20, 1977 (invited speaker)
12. Symposium on Nonlinear Equations in Abstract Spaces, University of Texas at Arlington, Arlington, Texas, June 8-10, 1977 (invited speaker).
13. Symposium on Nonlinear Evolution Equations, University of Wisconsin, October 17-19, 1977.
14. Symposium on Nonlinear Analysis and Applications, Heriot-Watt University, Edinburgh, Scotland, August 7-10, 1978 (invited speaker).
15. Helsinki Symposium on Integral Equations, Helsinki Institute of Technology, Helsinki, Finland, August 11-14, 1978 (invited speaker).
16. Functional Differential Equations and Integral Equations Conference, West Virginia University, June 18-20, 1979 (invited speaker).
17. Canadian Mathematical Society Annual Seminar-Functional Differential Equations, University of Toronto, July 30 - August 3, 1979 (invited speaker).

18. Special Session on Linear and Nonlinear Age-dependent models of Population Growth, Amer. Math. Soc. Annual Meeting, Jan. 3-4, 1980, San Antonio, Texas (invited speaker).
19. Nonlinear Differential Equations: Invariance, Stability, and Bifurcation, Universita di Trento, Trent, Italy, May 25-30, 1980 (invited speaker).
20. Workshop on Nonlinear Boundary Value Problems, International Centre for Theoretical Physics, Trieste, Italy, June 9-20, 1980 (invited speaker).
21. Conference on Differential Equations and Applications to Ecology, Epidemics and Population Problems, Harvey Mudd College, Claremont, California, January 10-11, 1981 (invited speaker)
22. Conference on Differential Equations and Applications, Schloss Retzhof, Austria, June 2-6, 1981 (invited speaker).
23. Southeastern-Atlantic Regional Conference on Differential Equations, Virginia Tech, Blacksburg, VA, November 13-14, 1981.
24. 10th IMACS Conference on Systems Simulation and Scientific Computing, Montreal, Canada, August 10-12, 1982.
25. Southeastern-Atlantic Regional Conference on Differential Equations, North Carolina State University, October 8-9, 1982.
26. International Conference on Operator Semigroups and Applications, Schloss Retzhof, Austria, June 6-11, 1983 (invited speaker).
27. Southeastern-Atlantic Regional Conference on Differential Equations, Wake Forest University, October 12-13, 1984 (principal speaker).
28. Southeastern-Atlantic Regional Conference on Differential Equations, Georgia Institute of Technology, October 25-26, 1985.
29. SIAM 1986 National Meeting, Boston, July 20-25, 1986.
30. Midwest Differential Equations Conference, Marquette University, October 17-18, 1986 (principal speaker).
31. Southeastern-Atlantic Regional Conference on Differential Equations, Clemson University, October 24-25, 1986.
32. Conference on Mathematical Population Dynamics, The University of Mississippi, Oxford, Mississippi, November 20-22, 1986 (principal speaker).
33. Trends in Semigroup Theory and Applications, Universita di Trieste, Trieste, Italy, September 28 - October 2, 1987 (invited speaker)
34. Combined Midwest-Southeast Differential Equations Conference, Vanderbilt University, Nashville, Tennessee, October 23-24, 1987 (organizer).
35. Special Session on Nonlinear Differential-Delay Equations, Amer. Math. Soc. Annual Meeting, Jan. 6-8, 1988, Atlanta, Georgia (invited speaker).
36. One-parameter Semigroups and Differential Operators, Mathematisches Forschungsinstitut, Jan. 25-30, 1988, Oberwolfach, Germany (invited speaker).
37. Conference on Differential Equations and Population Biology, University of Alberta, Edmonton, Alberta, Canada, June 20-25, 1988.
38. Southeastern-Atlantic Regional Conference on Differential Equations, University of Georgia, November 4-5, 1988.

39. Special Session on Mathematics in Population Biology, Amer. Math. Soc. Annual Meeting, Jan. 11-14, 1989, Phoenix, Arizona (invited speaker).
40. Second International Conference on Mathematical Population Dynamics, May 17-20, 1989, Rutgers University, New Brunswick, New Jersey (invited speaker and organizer)
41. Ninth Annual Georgia Tech Mathematics Conference, Georgia Tech, Atlanta, Georgia, October 28, 1989 (invited speaker)
42. International Conference on Differential Equations and Applications to Biology and Population Dynamics, Claremont, California, January 10-13, 1990 (invited speaker).
43. UTK/NSF Conference on Science, Mathematics, and Engineering Education, University of Tennessee, Knoxville, Tennessee, February 2-3, 1990.
44. UAB Conference on Differential Equations and Mathematical Physics, University of Alabama at Birmingham, Birmingham, Alabama, March 15-20, 1990.
45. Differential Equations in Banach Spaces, Universita di Bologna, Bologna, Italy, July 1-5, 1991 (invited speaker).
46. Georgia Tech - UAB International Conference on Differential Equations and Mathematical Physics, Atlanta, Georgia, March 22-28, 1992.
47. Third International Conference on Mathematical Population Dynamics, June 1-5, 1992, University of Pau, Pau, France (plenary speaker)
48. World Congress of Nonlinear Analysts, Special Session on Populations of Cells and Genes, Tampa, Florida, August 23-25, (invited speaker)
49. Midwest-Southeastern Atlantic Second Joint Regional Conference on Differential Equations, University of Kentucky, Kentucky, November 13- 14, 1992.
50. Evolution Equations Conference, Louisiana State University, Baton Rouge, Louisiana, January 7-11, 1993 (principal speaker)
51. Society for Mathematical Biology Annual Meeting, Cornell University, Ithaca, New York, July 10-13, 1993.
52. Regional Meeting of the American Mathematical Society Special Session in Reaction Diffusion Equations, Texas A & M University, College Station, Texas, October 22-28, 1993 (invited speaker).
53. Second European Conference on Mathematics Applied to Biology and Medicine, Lyon, France, December 15-17, 1993 (invited speaker).
54. UAB-Georgia Tech International Conference on Mathematical Physics and Differential Equations, University of Alabama at Birmingham, Birmingham, Alabama, March 17, 1994.55. First World Congress on Computational Medicine and Public Health, University of Texas System Center for High Performance Computing, Austin, Texas, April 24-29, 1994 (invited speaker).
56. International conference on Differential Equations and Applications to Biology and to Industry, Harvey Mudd College, Claremont, California, June 1-4, 1994 (invited speaker).
57. Conference on Evolution Equations, University of Strathclyde, Glasgow, Scotland, July 25-29, 1994 (plenary speaker)
58. Evolution Equations and Semigroups, Scuola Normale Superiore di Pisa, Pisa, Italy, September 26 - October 1, 1994 (invited speaker).



59. ICMS Workshop: Chemotherapy Modelling, Heriot-Watt University and Edinburgh University, Edinburgh, Scotland, April 10-14, 1995 (principal speaker).
60. Fourth International Conference on Mathematical Population Dynamics, Rice University, Houston, Texas, May 23-27, 1995, (plenary speaker).
61. 2nd Marrakesh International Conference on Differential Equations, University of Marrakesh, Marrakesh, Morocco, June 16-20, 1995 (plenary speaker).
62. Waves and memory in Continua: A meeting in Honor of Richard C. MacCamy, Carnegie-Mellon University, Pittsburgh, Pennsylvania, August 17-19, 1995.
63. Conference in Honor of A. Bressan, Universita di Padova, Padua, Italy, May 26-28, 1996.
64. Society for Mathematical Biology Annual Meeting, University of Washington, Seattle Washington, August 8-13, 1996.
65. Conference on Evolution Equations and Their Applications to Technology, Hiroshima, Japan, October 27-31, 1996 (invited speaker).
66. Conference on Mathematical Models in Medical and Health Sciences, Vanderbilt University, Nashville, Tennessee, May 28-31, 1997 (organizer).
67. Summer School on Cell Population Dynamics, Saint-Flour, France, June 2-13, 1997 (Lecturer).
68. International Conference on Differential Equations with Applications to Biology, Dalhousie University, Halifax, Nova Scotia, July 25-29, 1997, (Plenary Speaker)
69. Third Midwest-Southeastern Atlantic Joint Regional Conference on Differential Equations, Vanderbilt University, Nashville, Tennessee, November 7-9, 1997, Organizer.
70. Joint Meeting of the Sociedad Matematica Mexicana and the American Mathematical Society, Special Session on Nonlinear Models in Biology, Oaxaca, Mexico, December 4-6, 1997.
71. Conference on Mathematical and Statistical Models in Health Sciences, University of Memphis, Memphis, Tennessee, March 27-28, 1998.
72. Population Dynamics Workshop, Chalmers University, Gothenburg, Sweden, May 11-15, 1998 (invited speaker).
73. Fifth International Conference on Mathematical Population Dynamics, Zakopane, Poland, June 21-26, 1998 (organizer and speaker in the Special Session on Cancer Diagnosis and Therapy and speaker in the Special Session on Viral and Cellular Dynamics during HIV Infection).
74. Conference on Asymptotic Properties of Evolution Equations, The Banach Center, Warsaw, Poland, June 29 - July 3, 1998 (invited speaker).
75. Workshop on the Dynamics and Control of AIDS, Institute for Mathematics and its Applications, University of Minnesota, November 7-10, 1998 (invited speaker).
76. Workshop on Mathematical Approaches for Emerging and Reemerging Infectious Diseases, Institute for Mathematics and its Applications, University of Minnesota, May 17-21, 1999 (invited speaker).
77. Second Summer School in Mathematical Biology, Termoli, Italy, June 12-19, 1999 (invited lecturer).
78. Annual Meeting of the Genetics Society of Japan, University of Hiroshima, Hiroshima, Japan, September 24-26, 1999 (invited speaker).

79. Southeastern Atlantic Regional Conference on Differential Equations, University of Richmond, Richmond, Virginia, October 22-23, 1999 (plenary speaker).
80. Society of Mathematical Biology Annual Meeting, University of Utah, Salt Lake City, Utah, August 3-5, 2000 (invited speaker).
81. Second International Conference on Deterministic and Stochastic Modeling of Biointeractions, Purdue University, August 23 -27, 2000 (invited speaker).
82. Evolution Equations 2000: Applications to Physics, Industry, Life Sciences and Economics, Trento, Italy, October 30 - November 4, 2000 (invited speaker).
83. Amer. Math. Soc. Annual Meeting, Special Session on Partial Differential Equations in Population Biology and Epidemics, New Orleans, Louisiana, January 10-11. 2001.
84. European Society of Mathematical and Theoretical Biology, School on Biology and Mathematics of Cells, Sigüenza, Spain, June 15-22, 2001 (invited lecturer).
85. Southeast Conference on Applied Mathematics, North Carolina State University, Raleigh, North Carolina, November 8-11, 2001 (invited speaker).
86. First SIAM Conference on the Life Sciences, Boston, Massachusetts, March 6-8, 2002 (plenary speaker).
87. Workshop on Mathematical Models of Cancer, Vanderbilt University, Nashville, Tennessee, May 3-5, 2002 (organizer).
87. International Conference on Computation Mathematics and Modeling, Bangkok, Thailand, May 22-24, 2002 (plenary speaker).
88. School on Population Dynamics, Bedlewo, Poland, June 17-22, 2002 (invited lecturer).
89. Conference on Mathematical Modeling of Population Dynamics, Bedlewo, Poland, June 24-28. 2002 (invited speaker).
90. International Congress of Mathematicians Satellite Conference on Mathematical Biology, Guilin, China, August 15-18, 2002 (plenary speaker).
91. Beijing University of Science and Technology, Beijing, China, August 12. 2002 (invited colloquium speaker).
92. Workshop on Biodefense, Institute for Mathematics and its Applications, University of Minnesota, Minneapolis, Minnesota, September 28, 2002 (invited speaker).
93. American Mathematical Society Sectional Meeting, University of North Carolina, Chapel Hill, North Carolina, October 25, 2003, (speaker and organizer of the Special Session on Mathematical Models in Medicine).
94. American Mathematical Society Sectional Meeting, Florida State University, Tallahassee, Florida, March 12-13, 2004 (invited address).
95. Workshop on Immunology Models, Mathematical Biosciences Institute, Ohio State University, Columbus, Ohio, May 10-14, 2004.
96. Joint Meeting of the American Mathematical Society and Sociedad Matemática Mexicana, Special Session on Continuous Distributed Parameters Models in Mathematical Biology, Houston, Texas, May 13-15, 2004 (invited speaker).
97. Computational and Mathematical Population Dynamics, University of Trent, Trento, Italy, June 21-25, 2004.

98. International Conference on Nonlinear Dynamics and Evolution Equations, Memorial University of Newfoundland, St. John's, Newfoundland, Canada, July 6-10, 2004 (plenary speaker).
99. American Mathematical Society Sectional Meeting, Vanderbilt University, Nashville, Tennessee, October 16-17, 2004, (speaker and organizer of the Special Session on Mathematical Biology).
100. John Neuberger Conference, University of North Texas, Denton, Texas, October 30-31, 2004 (invited speaker).
101. Mathematical Modeling, Implications for Pandemic Influenza Preparedness Workshop, MITACS, Public Health Agency Canada, British Columbia Centre for Disease Control, Vancouver, Canada, March 30-31, 2005 (invited speaker).
102. Workshop on Modeling the Rapid Evolution of Infectious Diseases: Epidemiology and Treatment Strategies, Fields Institute, University of Western Ontario, London, Canada, May 14-17, 2005 (organizer).
103. International Workshop on Differential Equations in Mathematical Biology, University of Le Havre, Le Havre, France, July 11-13, 2005 (organizer and invited speaker).
104. Control Theory with Modeling Applications to Physiology and Medicine, Summer School in Graz, July 24 - August 5, 2005 (invited speaker).
105. Vanderbilt Integrative Cancer Biology Center 1<sup>st</sup> Annual Workshop, Mathematical Modeling in Cancer Biology, Vanderbilt University, Nashville, TN, August 8-12, 2005 (invited lecturer).
106. Workshop on Mathematical Models in Biology and Medicine, February 3-4, 2006, Arizona State University (keynote speaker).
107. Vanderbilt Integrative Cancer Biology Center Annual Workshop, Building Mathematical Models of Cancer Across Biological Scales, Vanderbilt University, Nashville, TN, July 18-21, 2006.
108. Bridging the scales of disease dynamics 2006, University of British Columbia, Vancouver, Canada, September 27-29, 2006 (invited speaker).
109. Mathematical Association of America Undergraduate Research Conference, University of Tennessee, Knoxville, TN, April 14, 2007 (guest speaker).
110. Conference on Frontiers in Applied and Computational Mathematics, New Jersey Institute of Technology, Newark, NJ, May 14-16, 2007 (invited speaker).
111. Vanderbilt Integrative Cancer Biology Center 3<sup>rd</sup> Annual Workshop, Mathematical Modeling and Clinical Oncology: The Road to Convergence, Vanderbilt University, Nashville, TN, July 15-19, 2007 (invited speaker).
112. Seventh Mississippi State – University of Alabama at Birmingham Conference on Differential Equations & Computational Simulations, Birmingham, AL, November 2-3, 2007 (invited speaker).
113. American Association for the Advancement of Science, Annual Meeting, Boston, MA, Special Session on Modeling the dynamics of the drug-resistant killers of the 21st century, February 17, 2008 (invited speaker).
114. Atlantic Coast Symposium on the Mathematical Sciences in Biology and Biomedicine, North Carolina State University, Raleigh, North Carolina, April 24-26, 2008 (plenary speaker).
115. Workshop on Population Dynamics and Mathematical Biology, Centre International Rencontres Mathematiques, Luminy, France, June 16-20 2008 (plenary speaker).
116. Conference on Differential Equations and Applications to Mathematical Biology, University of Le Havre, Le Havre,

France, June 23-27, 2008 (plenary speaker).

117. Workshop on the Growth and Control of Tumors: Theory and Experiment, Fields Institute, Toronto, Canada, July 2-4, 2008 (invited speaker).
118. Conference on Differential Equations and Applications in Ecology and Epidemiology, Purdue University, West Lafayette, Indiana, December 8-10, 2008 (invited speaker).
119. Mathematical Modeling in the Medical Sciences, 24<sup>th</sup> Annual Shanks Lectures, Vanderbilt University, Nashville, Tennessee, May 18-21, 2009 (organizer).
120. Mathematics of Influenza: Models for the Transmission Dynamics and Control of Seasonal and Pandemic Flu Outbreaks, SIAM Annual Meeting, Denver, Colorado, July 9,10, 2009 (invited speaker).
121. 19<sup>th</sup> Annual Meeting of the Japanese Society for Mathematical Biology, University of Tokyo, Tokyo, Japan, September 11, 2009 (plenary speaker).
122. White Workshop on Mathematical Biology, University of Trent, Trento, Italy, December 17-19, 2009 (plenary speaker).
123. CMPD3 Computational and Mathematical Population Dynamics, University of Bordeaux, Bordeaux, France, May 31-June 4, 2010 (contributed speaker).
124. 10<sup>th</sup> Red Raider Mini-Symposium, Mathematical Modeling in Population Biology and Epidemiology, Texas Tech University, Lubbock, Texas, October 28-29, 2010 (invited speaker).
125. Partial Differential Equations and Applications, Laboratoire de Mathematiques et Applications, University of Poitiers, Poitiers, France, June 10, 2011.
126. Exploratory Workshop on Emerging Infectious Diseases and Mathematical Modelling, Centre de Recerca Matematica, Bellaterra, Barcelona, Spain, July 11-15, 2011 (invited speaker).
127. Mathematical Innovative Methods and Models of BIOsciences, University of Trent, Trento, Italy, December 19-21, 2011 (organizer and invited speaker).
128. Rocky Mountain Mathematics Consortium Summer School 2012, Mathematical Modeling in Ecology and Epidemiology, University of Wyoming, Laramie, Wyoming, June 11-22, 2012 (lecturer).
129. Canadian Applied and Industrial Mathematics Annual Meeting, Fields Institute, Toronto, Canada, June 24-28, 2012 (lecturer).
130. International Conference on Computational Analysis of Inverse Problems and Partial Differential Equations, University of Central Florida, Orlando, Florida, May 9-11, 2013 (plenary speaker).
131. Fourth Conference on Computational and Mathematical Population Dynamics, Taiyuan, China, May 29-June 2, 2013 (contributed speaker).
132. University to Tennessee at Knoxville, Knoxville, Tennessee, September 21, 2013, Southeastern Atlantic Regional Conference on Differential Equations (plenary speaker).
133. American Mathematical Society Sectional Meeting, University of Louisville, Louisville, Kentucky, October 5,6, 2013 (contributed talk in Special Session on Mathematical Issues in Ecological and Epidemiological Modeling).
134. Second Scottish Partial Differential Equations Colloquium, International Centre for Mathematical Sciences, Edinburgh, Scotland, May 16, 2014 (plenary speaker).

135. International Symposium on Mathematical Biology, Guangzhou University, Guangzhou, China, May 29, 2014 (invited speaker).
136. Applied Mathematics Conference, Oakland University, Rochester, Michigan, September 13, 2014 (invited speaker).
137. American Mathematical Society Sectional Meeting, University of Alabama at Huntsville, Huntsville, Alabama, March 27-29, 2015 (contributed talk in Special Session on New Developments in Population Dynamics and Epidemiology).
138. Theme on Structured Delay Systems, Fields Institute for Research in Mathematical Sciences, Toronto, Canada, May 19-22, 2015 (conference organizer).
139. Summer School on Mathematical Biology in Guangzhou University, July 26-31, 2015, Guangzhou, China (invited lecturer).
140. Joint International Conference on Mathematical Biology via Guangzhou University and Huaihua University, August 1-6, 2015, Huaihua, China (invited speaker).
141. Contributions to PDE for Applications, Laboratoire Jacques-Louis Lions, Université Pierre et Marie Curie, August 31-September 1, 2015, University of Paris VI, Paris, France (invited speaker).
142. Mathematics of Life Conference, University of Helsinki, March 7-10, 2016, Helsinki, Finland (invited speaker).
143. International Conference on Evolution Equations, Vanderbilt University, Nashville, TN, May 16-20, 2016.
144. 10<sup>th</sup> European Conference on Mathematical & Theoretical Biology and Society of Mathematical Biology Annual Meeting, University of Nottingham, Nottingham, England, July 11-15, 2016 (contributed talk and special session organizer).
145. 2016 Summer School on Mathematical Biology, Guangzhou University, August 1-6, 2016, Guangzhou, China (invited lecturer).
146. Mini-Symposium on Differential Equations and Mathematical Biology, Xiangnan University, August 8, 2016, Chenzhou, China (invited lecturer).
147. Control of Distributed Parameter Systems, University of Bordeaux, July 3-7, 2017, Bordeaux, France (invited speaker).
148. Populations in Epidemics and Ecology, Modeling and Numerical Simulations, Basque Center for Applied Mathematics, Bilbao, Spain, July 4-5, 2017 (invited speaker).
149. 2017 Summer School on Mathematical Biology, Center of Applied Mathematics, Guangzhou University, Guangzhou, China, August 3-8, 2017 (invited lecturer).
150. Mini-Symposium on Mathematical Biology, University of South China, Hengyang, China, August 9, 2017 (invited speaker).
151. American Association for the Advancement of Science Annual Meeting, Mathematics of Planet Earth: Superbugs, Storm Surges, and Ecosystem Change, Austin Texas, February 15-19, 2018 (invited speaker).
152. Shanks Workshop on Mathematical Aspects of Fluid Dynamics, Vanderbilt University, March 24-25, 2018.
153. American Mathematical Society 1138<sup>th</sup> Meeting, Nashville, TN, April 14-25, 2018, organizer.
154. Populations in Epidemics and Ecology, Modeling and Numerical Simulations II, Basque Center for Applied Mathematics, Bilbao, Spain, May 16 – 18, 2018 (invited speaker).

155. 6<sup>th</sup> International Conference on Mathematical Biology, BUCEA, Beijing, PR China, June 22nd-25th, 2018 (plenary speaker).

156. First International Conference on Biomathematics in Senegal, Polytechnic School of Thies, Thies, Senegal, June 29 – July 1, 2018 (invited speaker).

## **RESEARCH GRANTS**

1. University Research Council Summer Grant, 1969, Nonlinear Evolution Equations and Semigroups of Nonlinear Transformations.
2. University Research Council Summer Grant, 1970, Nonlinear Evolution Equations in Banach Spaces.
3. University Research Council Summer Grant, 1971, Nonlinear Evolution Equations.
4. National Science Foundation, June 1, 1972 - May 31, 1973, Nonlinear Functional Analysis (Principal Investigator).
5. National Science Foundation, June 1, 1973 - May 31, 1974, Nonlinear Functional Analysis (Principal Investigator).
6. National Science Foundation, June 1, 1975 - May 31, 1976, Nonlinear Operator Semigroups (Principal Investigator).
7. National Science Foundation, June 1, 1976 - May 31, 1977, Nonlinear Operator Semigroups (Principal Investigator).
8. National Science Foundation, June 1, 1977 - May 31, 1979, Abstract Nonlinear Differential Equations (Principal Investigator).
9. National Science Foundation, June 1, 1979 - May 31, 1981, Abstract Nonlinear Differential Equations and Age-Dependent Populations Models (Principal Investigator).
10. National Science Foundation, June 1, 1981 - May 31, 1983, Abstract Nonlinear Differential Equations and Mathematical Population Models (Principal Investigator).
11. National Science Foundation, June 1, 1986 - May 31, 1988, Mathematical Models of Cell Population Dynamics (Principal Investigator).
12. National Science Foundation, June 1, 1988 - May 31, 1990 Mathematical Models of Cell Population Dynamics (Principal Investigator).
13. National Science Foundation, July 1, 1990 - June 30, 1992, Mathematical Models of Cell Population Dynamics (Principal Investigator)..
14. National Science Foundation, Mathematical Sciences Research Equipment, 1991.
15. National Science Foundation, July 1, 1992 - June 30, 1995, Mathematical Models of Cell Population Dynamics (Principal Investigator).
16. National Science Foundation, July 1, 1995 - June 30, 1998, Mathematical Models of Structured Population Dynamics (Principal Investigator).
17. National Science Foundation, August 1, 1997 - July 31, 1998, Conference on Mathematical Models in Medical and Health Sciences.

18. National Science Foundation, August 1, 1998 - July 30, 2001, Mathematical Models of Cell Population Dynamics (Principal Investigator)..
19. National Institutes of Health, December 1, 1999 - November 30, 2003, Mathematical Models of *H. pylori* Gastric Colonization (Co-investigator).
20. National Science Foundation, September 1, 2001 - August 31, 2004, Mathematical Models of Structured Populations in Biology (Principal Investigator).
21. National Institutes of Health, November 1, 2004 February 8, 2015, Multiscale Mathematical Modeling of Cancer Invasion (Co-investigator).
22. National Institutes of Health, December 1, 2004 - November 30, 2008, Mathematical Models of *H. pylori* Gastric Colonization (Co-investigator).
23. National Science Foundation, May 14 - 17, 2005 - Workshop on Modeling the Rapid Evolution of Infectious Diseases, Fields Institute, University of Western Ontario, London, Canada.
24. National Institutes of Health, May 1, 2005 – August 31, 2010, CNS Viral Dynamics and Cellular Immunity during AIDS (Co-investigator).
25. National Science Foundation, August 1, 2005 – July 31, 2008, Mathematical Models of Structured Population Dynamics (Principal Investigator).
26. National Institute of General Medical Sciences, September 20, 2007 – June 6, 2013, Collaborative Research: Mathematical Modeling of the Superspreaders of Antibiotic-Resistant Bacteria (Co-investigator).
27. National Science Foundation, July 1, 2008 – June 30, 2009, Special Thematic Program: Mathematical and Quantitative Oncology, Fields Institute Workshops 2008 (Principal Investigator).
28. National Institute of General Medical Sciences, September 8, 2009 – August 31, 2014, Mathematical Models of *H. pylori* Gastric Colonization (Co-investigator).
29. National Science Foundation, November 1, 2009 – October 31, 2010, The 25<sup>th</sup> Annual Shanks Conference and Lecture: Mathematical Modeling in the Medical Sciences, Vanderbilt University (Principal Investigator).
30. National Institute of Allergy and Infectious Diseases, July 1, 2010 - June 30, 2013, Expanded Testing and Treatment for HIV Prevention Among MSM in China (consultant).
31. Association France Alzheimer, September, 2014 –August, 2015, Prion et Alzheimer – Modelization et Experimentation d'une Liasison (Co-investigator).
32. Royal Society UK, International Exchange Scheme, December 1, 2014 – November 30, 2015, Partial Differential Equation Modelling of Structured Cell Populations (Co-investigator).
33. Vanderbilt University School of Engineering, Project Premonition, High-through meta-genomics pipeline for pathogen detection, 2016 (10% effort), co-investigator.

## **INVITED COLLOQUIA**

1. North Carolina State University, Raleigh, North Carolina, June 1972.
2. University of Sussex, Brighton, England, April 30, 1974.
3. University of Paris, Paris, France, May 2, 1974.
4. Battelle Institute, Geneva, Switzerland, November 15, 1974.
5. Mathematisches Institut Universitat Zurich, Zurich, Switzerland, November 19, 1974.
6. Georgia Institute of Technology, Atlanta, Georgia, March 6, 1975.
7. University of Texas at Arlington, Arlington, Texas, March 14, 1975.
8. University of Houston, Houston, Texas, November 14, 1975.
9. University of Cincinnati, Cincinnati, Ohio, November 29, 1979.
10. Scuola Normale Superiore, Pisa, Italy, May 8, 1980.
11. Universita di Roma, Rome, Italy, May 12 and May 13, 1980.
12. Universita di Bari, Bari, Italy, May 14, 1980.
13. Universita di Trento, Trent, Italy, June 25, 1980.
14. University of South Florida, Tampa, Florida, January 30, 1981.
15. Universita di Padova, Padua, Italy, June 12 and June 15, 1981.
16. Universita di Bari, Bari, Italy, May 5 and May 7, 1982.
17. Universita di Trento, Trent, Italy, May 21, 1982.
18. Universita di Padova, Padua, Italy, May 24, 1982.
19. Universita di Roma, Rome, Italy, May 31, 1982.
20. University of Arkansas, Fayetteville, Arkansas, September 16, 1982.
21. Georgetown University, Washington, D.C., November 12, 1982.
22. University of Oklahoma, Norman, Oklahoma, February 17, 1983.
23. Claremont University, Claremont, California, March 8, 9, 10, 1983.
24. University of Florida, Gainesville, Florida, January 24, 1984.
25. North Carolina State University, Raleigh, North Carolina, April 4, 1984.
26. Emory University, Atlanta, Georgia, January 17, 1985.



27. M. D. Anderson Hospital and Tumor Institute, Houston, Texas, September 25, 1985.
28. University of Houston, Houston, Texas, September 26, 1985.
29. James Madison University, Harrisonburg, Virginia, October 10, 1985.
30. Michigan State University, East Lansing, Michigan, February 19, 1987.
31. University of Iowa, Iowa City, Iowa, April 14, 1988.
32. Tulane University, New Orleans, Louisiana, October 28, 1988.
33. Universita di Roma, Rome, Italy, July 8, 1991.
34. Centrum voor Wiskunde en Informatica, Amsterdam, The Netherlands, June 10, 1992.
35. Frontier Lecture Series, Texas A & M University, College Station, Texas, December 7-10, 1992.
36. University of Houston, Houston, Texas, December 11, 1992.
37. Universita di Padova, Padua, Italy, May 14, 1993.
38. University of South Alabama, Mobile, Alabama, May 26-29, 1994.
39. Oxford University, Oxford, England, July 22, 1994.
40. Texas A & M University, College Station, Texas, February 22, 1995.
42. University of Marrakesh, Marrakesh, Morocco, June 12-15, 1995.
43. Polytechnical University of Madrid, Madrid, Spain, June 21, 1995.
44. Universita di Padova, Padua, Italy, May 31, 1996.
45. Arizona State University, Tempe, Arizona, March 7, 1997.
46. Mayo Clinic, Rochester, Minnesota, March 25, 1997.
47. University of Marrakesh, Marrakesh, Morocco, June 20, 1997.
48. University of Michigan, Ann Arbor, Michigan, November 13, 1997.
49. University of Tennessee at Knoxville, Knoxville, Tennessee, March 5, 1998.
50. Universidad Nacional Autonoma de Mexico, Mexico City, Mexico, April 27, 28, 1998.
51. Centro Internacional de Ciencias, Cuernavaca, Morelos, Mexico, April 29, 30, 1998.
52. University of Alabama at Huntsville, Huntsville, Alabama, March 12, 1999.
53. North Carolina State University, Raleigh, North Carolina, March 31, 2000.
54. Universita di Padova, Padua, Italy, October 27, 2000.
55. Beijing University of Science and Technology, Beijing, China, August 12, 2002.

56. Middle Tennessee State University, Murfreesboro, Tennessee, October 9, 2002.
57. Meharry Medical College, Nashville, Tennessee, April 8, 2003.
58. Università di Padova, Padua, Italy, May 28, 2003.
59. University of Miami, Miami, Florida, October 10, 2003.
60. Università di Padova, Padua, Italy, June 14, 2004.
61. Tamkang University, Taipei, Taiwan, July 26, 2004.
62. National Center for Theoretical Sciences, National Tsing-Hua University, Hsinchu, Taiwan, July 29, 2004.
63. National Chung Hsing University, Taichung, Taiwan, July 30, 2004.
64. Purdue University, West Lafayette, Indiana, November 12, 2004.
65. Southern Methodist University, Dallas, Texas, November 17, 2004.
66. Escuela Técnica Superior de Ingenieros Industriales, Universidad Politécnica de Madrid, Madrid, Spain, July 17, 2005.
67. Mathematical Biology Institute, Ohio State University, Columbus, Ohio, November 1, 2005.
68. University of Victoria, Victoria, Canada, March 6, 2006.
69. Università di Padova, Padua, Italy, June 22, 2006.
70. Georgia Tech, Atlanta, Georgia, November 14, 2007.
71. University of California at Irvine, Irvine, California, May 5, 2008.
72. Scuola Galileiana di Studi Superiore, University of Padua, Padua, Italy, Invited Lectures, May 22, 23, 28, 29, 2008.
73. University of Bordeaux 2, Bordeaux, France, March 23, 2009.
74. Centre de Recerca Matemàtica, Universitat Autònoma de Barcelona, Barcelona, Spain, March 26, 2009.
75. University of Le Havre, Le Havre, France, April 3, 2009.
76. University of Tokyo, Tokyo, Japan, September 8, 2009.
77. University of Paris VI, Faculté de Mathématiques Pierre et Marie Curie, Paris, France, June 8, 2010.
78. University of Lyon, Institut Camille Jordan, Lyon, France, June 9, 2011.
79. Middle Tennessee State University, MTSU Fall 2011 Distinguished Lecture, Murfreesboro, TN, October 19, 2011.
80. Purdue University, CCAM Visiting Scientists Program on Mathematical Biology Colloquium, West Lafayette, IN, March 9, 2012.
81. City University of Hong Kong, Hong Kong, China, May 16, 2012.
82. Hong Kong Polytechnic University, Hong Kong, China, May 16, 2012.
83. Universität Duisburg-Essen, Essen, Germany, Invited address in honor of Prof. Dr. Wolfgang Ruesch, February 7, 2013.

84. Universitat Duisburg-Essen, Essen, Germany, Fakultat fur Mathematik, February 8, 2013.
85. University of Wisconsin at Milwaukee, Milwaukee, Wisconsin, April 5, 2013.
86. Beijing Normal University, Beijing, China, May 27, 2013.
87. University of Tennessee at Chattanooga, Chattanooga, Tennessee, July 25, 2013.
88. Guangzhou University, Guangzhou, China, May 29, 2014.
89. Georgia State University, Atlanta, Georgia, Distinguished Lecture, December 5, 2014.
90. Ohio State University, Columbus, Ohio, March 22, 2016.
91. Stirling University, Stirling, Scotland, July 6, 2016.
92. Middle Tennessee State University, Murfreesboro, Tennessee, October 23, 2017.
93. University of Tennessee at Chattanooga, Chattanooga, Tennessee, September 21, 2018.