# CURRICULUM VITAE

YUAN LOU

Department of Mathematics
The Ohio State University
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**Degrees**

Ph.D., University of Minnesota, 1995

M.S., Beijing University, 1991

B.S., Beijing University, 1988

**Experience**

Professor, Dept. of Mathematics, Ohio State University, 2008-

Associate Professor, Dept. of Mathematics, Ohio State University, 2003-08

Assistant Professor, Dept. of Mathematics, Ohio State University, 1998-2003

L.E. Dickson Instructor, Dept. of Mathematics, Univ. of Chicago, 1996-98

Postdoc, Mathematical Sciences Research Institute at Berkeley, 1995-96

**Professional activities**

Referee (math journals): Applied Math Letters, Asymptotic Analysis, Computer & Mathematics with applications, Discrete and Continuous Dynamical Systems A&B, Differential Integral Equations, Journal of AMS, Journal of Computational and Applied Mathematics, Journal of Dynamical and Differential equations, Journal of Differential Equations, Journal of Functional Analysis, Journal of London Math. Soc., Journal of Math. Anal. Appl., Mathematische Annalen, Nonlinearity, Nonlinear Analysis, Proc. of AMS, Proc. of Royal Society of Edinburgh A, The Anziam Journal, Science in China, SIAM J. Appl. Math., SIAM J. of Math. Anal, Tohoku Mathematical Journal, Transactions of AMS

Referee (biomath journals): Bulletin of Mathematical Biology, Journal of Biological Dynamics, Journal of Mathematical Biology, Mathematical Biosciences and Engineering, Theoretical Population Biology

Conference/Workshop Organizer: Minisyposium, SIAM Pacific Rim Dynamical Systems Conference, 2000; MBI Summer Program in Ecology and Evolution, July 17-Aug 4, 2006; "Differential Equations and Biology: An International Conference in Honor of Avner Friedman", Nov 15-18, 2007, Ohio State University; Midwest PDE seminar, Nov 2008, Ohio State University; International Workshop on Mathematical Biology: Modeling and Analysis, National Taiwan Normal University

Grant review: NSF (2006, 2007, 2008), US-Israel Binational Science Foundation(2007), Hong Kong Research Council(2005, 2006), Chilean Research Fund Council(2004, 2006).

Editorial Board: Discrete and Continuous Dynamical System-S, 2008-2009; Discrete and Continuous Dynamical System-B, 2009–; Mathematical Biosciences and Enegineering, 2009–

**Publications**


[1] (with C. Gui) Uniqueness and non-uniqueness of coexistence states in the Lotka-Volterra competition model. *Comm. Pure Appl. Math.* **XLVII** (1994), 1571-1594.

[2] On basic semiconductor equations with heat conduction. *J. Part. Diff. Eqs.* **8** (1995), 43-54.

[3] Necessary and sufficient condition for the existence of positive solutions of certain cooperative system. *Nonlin. Anal.: Theory, Meth. Appl.* **26** (1996), 1079-1095.

[4] (with W. M. Ni) Diffusion, self-diffusion and cross-diffusion. *J. Diff. Eqs.* **131** (1996), 79-131.

[5] (with Y. Du) Some uniqueness and exact multiplicity results for a predator-prey model. *Trans. Amer. Math. Soc.* **349** (1997), 2443-2475.

[6] (with Y. Du) S-shaped global bifurcation curve of positive solutions to a prey-predator model. *J. Diff. Eqs.* **144** (1998), 390-440.

[7] (with W.M. Ni and Y.P. Wu) The global existence of solutions for a class of cross-diffusion system. *Disc. Cont. Dyn. Sys.* **4** (1998), 193-203.

[8] Uniqueness and non-uniqueness of metrics with prescribed scalar curvature on compact manifolds. *Indiana Math. J.* **47** (1998), 1065-1081.

[9] (with M. Zhu) Classifications of non-negative solutions to some elliptic problems. *Diff. Int. Eqs.* **4** (1999), 601-612.

[10] (with W.M. Ni) Diffusion vs. cross-diffusion: an elliptic approach. *J. Diff. Eqs.* **154** (1999), 157-190.

[11] (with S. Martinez and W.M. Ni) On $3 \times 3$ Lotka-Volterra competition systems with cross-diffusion. *Dis. Cont. Dyn. Sys.* **6** (2000), 175-190.

[12] (with Y. Du) Proof of a conjecture for the perturbed Gelfand equation from combustion theory, *J. Diff. Eqs.* **173** (2001), 213-230.

[13] (with Y. Du) Constant and non-constant positive solutions of a predator-prey system with Neumann boundary conditions. *Proc. Roy. Soc. Edinb.* **131A** (2001), 321-349.

[14] (with T. Nagylaki and W.M. Ni) On diffusion-induced blowups in a cooperative model. *Nonl. Anal.: Theory, Meth. Appl.* **45** (2001), 329-342.

[15] (with T. Nagylaki) Patterns of multiallelic polymorphism maintained by migration and selection. *Theor. Pop. Biol.* **59** (2001), 297-313.

[16] (with T. Nagylaki) A semilinear parabolic system For migration and selection in population genetics. *J. Diff. Eqs.* **181** (2002), 388-418.

[17] (with V. Hutson and K. Mischaikow) Spatial heterogeneity of resources versus Lotka-Volterra Dynamics. *J. Diff. Eqs.* **185** (2002), 97-136.

[18] (with C. Cosner) When does movement toward better environments benefit a population? *J. Math Anal. Appl.* **277** (2003), 489-503.

[19] (with V. Hutson, K. Mischaikow and P. Polacik) Competing species near the degenerate limit. *SIAM J. Math. Anal.* **35** (2003) pp. 453-491.

[20] (with W.M. Ni and S. Yotsutani), On a limiting system in the Lotka-Volterra competition with cross-diffusion. *Dis. Cont. Dyn. Sys.* **10** (2004) 435-458.

[21] (with M. Zhu) A singularly perturbed linear eigenvalue problem in $C^1$ domains. *Pacific J. Math.* **142** (2004) 323-334.

[22] (with Q. Nie and F.Y.M. Wan) Eigenvalue problems in the stability analysis of morphogen gradients, *Stud. in Appl. Math.* **113** (2004) 183-215.

[23] (with T. Nagylaki) The evolution of a semilinear parabolic system for migration and selection in population genetics, *J. Diff. Eqs.* **204** (2004) 292-322.

[24] (with R.S. Cantrell and C. Cosner) Multiple reversals of competitive dominance in ecological reserves via external habitat degradation, *J. Dyn. Diff. Eqs.* **16** (2004) 973-1010.

[25] (with V. Hutson and K. Mischaikow) Convergence in competition models with small diffusion coefficients, *J. Diff. Eqs.* **211** (2005) 135-161.

[26] (with Q. Nie and F.Y.M. Wan) Effects of Sog on Dpp-receptor binding, *SIAM J. Appl. Math.* **65** (2005) 1748-1771.

[27] On the effects of migration and spatial heterogeneity on single and multiple species, *J. Diff. Eqs.* **223** (2006) 400-426.

[28] (with T. Nagylaki) Multiallelic selection polymorphism, *Theor. Pop. Biol.* **69** (2006) 217-229.

[29] (with T. Nagylaki) Evolution of A Semilinear Parabolic System for Migration and Selection without dominance, *J. Diff. Eqs.* **225** (2006) 624-665.

[30] (with E. Yanagida) Minimization of the principal eigenvalue with indefinite weight and applications to population dynamics, *Japan J. Indus. Appl. Math* **23** (2006) pp. 275-292

[31] (with T. Nagylaki) Evolution of the multiallelic Leven model, *Theor. Pop. Biol.* **70** (2006) pp. 401-411.

[32] (with S. Martinez and P. Poláčik) Loops and branches of coexistence states in a Lotka-Volterra competition model, *J. Diff. Eqs.* **230** (2006) pp. 720-742.

[33] (with R.S. Cantrell and C. Cosner) Movement towards better environments and the evolution of rapid diffusion, *Math Biosciences* **204** (2006) pp. 199-214.

[34] (with R.S. Cantrell, C. Cosner) Advection mediated coexistence of competing species, *Proc. Roy. Soc. Edinb.* **137A** (2007) 497-518.

[35] (with T. Nagylaki) Evolution at a multiallelic locus under migration and uniform selection, *J. Math. Biology* **54** (2007) 787-796.

[36] (with T. Nagylaki) Evolution under multiallelic migration-selection models, *Theor. Pop. Biol.* **72** (2007) 21-40.

[37] (with L. Allen, B.Bolker and A. Nevai) Asymptotic profile of the steady states for an SIS epidemic patch model, *SIAM J. Appl. Math* **67** (2007) 1283-1309.

[38] (with T. Nagylaki) The dynamics of migration-selection models, Pp.117-170 in: Friedman, A. (Ed.), *Tutor. Math. Biosci. vol IV: Evolution and Ecology*, Lect. Notes Mathematics Vol. 1922, Springer, 2007.

[39] Some challenging mathematical problems in evolution of dispersal and population dynamics, Pp.171-205 in: Friedman, A. (Ed.), *Tutor. Math. Biosci. vol IV: Evolution and Ecology*, Lect. Notes Mathematics Vol. 1922, Springer, 2007.

[40] (with L. Allen, B.Bolker and A. Nevai) Asymptotic profile of the steady states for a spatial SIS epidemic disease reaction-diffusion model, *Discre. Cont. Dyn. Sys. A*, **21** (2008) 145-164.

[41] (with C.Y. Kao and E. Yanagida) Principal eigenvalue for an elliptic problem with indefinite weight on cylindrical domains, Math. Biosci. Eng., **5** (2008) 315-335.

[42] (with X.F. Chen) Principal eigenvalue and Eigenfunction of elliptic operator with large Convection and its application to a competition model, *Indiana Math Univ. Journal*, Vol. 57 (2008) 627-658.

[43] (with Xinfu Chen and R. Hambrock) Evolution of conditional dispersal: a reaction-diffusion-advection model, *J. Math. Biol.* Vol. 57 (2008) 361-386.

[44] (with R.S. Cantrell and C. Cosner) Approximating the ideal free distribution via reaction-diffusion-advection equations, *J. Diff. Eqs.* Vol. 245 (2008) 3687-3703.

[45] (with L. Allen and A. Nevai) Spatial patterns in a discrete-time SIS patch model, *J. Math Biol.* Vol. 58 (2009) 339-375.

[46] (with Sam Flaxman) Tracking prey or tracking the prey's resource? Mechanisms of movement and optimal habitat selection by predators, *J. Theo. Biol.*, Vol. 256 (2009) 187-200.

[47] (with S. Martinez) Evolution of cross-diffusion and self-diffusion, J. Biol. Dys., in press, 2009.

[48] (with R. Hambrock) Evolution of mixed dispersal strategy in spatially heterogeneous habitat, Bull. Math. Biol., to appear, 2009.

[49] (with R.S. Cantrell and C. Cosner) Evolution of dispersal in heterogeneous landscape, *Spatial Ecology*, Chapman Hall/CRC Press, to appear, 2009.

[50] (with W. Ding, H. Finotti, S. Lenhart, Y. Lou and Q. Ye) Elliptic PDE problem with control on growth coefficient, Nonlinear Analysis, in revision, 2008.

[51] (with S. Flaxman) Predators quickly drive prey to a simultaneous ideal free distribution, submitted, 2008.

[52] (with C-Y Kao and W.X. Shen) Random dispersal vs non-local dispersal, submitted, 2008.

**Awards**

NSF Science Foundation UBM-Institutional DBI-0827256 (Co-PI): BioMathletic Training: Creating the next generation of BioMath stars at Ohio State University, NSF Biological Infrastructure, 2008-2013, $980,012.

National Science Foundation Research Grant DMS-0615845 (PI), "Evolution of Conditional Dispersal and Population Dynamics", Math. Biology Program and Ecology Program, 2006-09, $176,512.

National Science Foundation Research Grant DMS-9801609 (PI), "Nonlinear Problems from Combustion Theory and Biology", Analysis Program, 1998-02.

The Ohio State University Seed Grant, 1998-00.

Alfred P. Sloan Doctoral Dissertation Fellowship, 1994-95.

Excellent Ph.D Thesis Award, University of Minnesota, 1995.

Excellence in Teaching Award, University of Minnesota, 1995.

**Graduate Students**

Richard Hambrock (Ph.D, Nov 2007), Andriy Bezuglyy (expected 2009), Isabel Averill (expected 2011), Dan Munther (expected 2011)

**Invited talks**

1995

Stanford University, Analysis seminar.

University of California at Davis, Recruitment talk.

University of California at Davis, Geometry seminar.

1996

Mathematical Sciences Research Institute at Berkeley, seminar.

University of California at Berkeley, PDE seminar.

University of California at Davis, Colloquium.

Midwest PDE seminar, University of Kentucky.

University of Minnesota, Minisyposium, Invited lecture.

University of Chicago, Calderon-Zygmund analysis seminar.

University of Iowa, Colloquium.

1997

Courant Institute, Analysis seminar.

AMS Regional Meeting, Milwaukee, PDE session.

University of Chicago, Applied Math Seminar.

1998

AMS Regional Meeting, Philadelphia, PDE session.

Cornell University, Recruitment talk.

Northwestern University, Analysis seminar.

Georgia Institute of Technology, Recruitment talk.

Texas A&M University, Recruitment talk.

The Ohio State University, Recruitment talk.

University of Chicago, Calderon-Zygmund analysis seminar.

University of Notre Dame, Analysis seminar

The Ohio State University, Applied math seminar.

1999

International Conf. on Dyn. Sys. and Appl., PDE session.

Georgia Institute of Technology, CDSNS seminar.

The Wright State University, Colloquium.

The Ohio State University, Applied math seminar.

2000

GA Tech, CDSNS Colloquium.

University of Oklahoma, Colloquium.

University of Oklahoma, Analysis seminar.

SIAM Pacific Rim Dynamical Systems Conference, Minisyposium.

University of Minnesota, PDE seminar.

GA Tech, Workshop on Diff. Equa. and Biol., Invited lecture.

2001

University of Miami, Colloquium.

University of Cincinnati, Colloquium.

PIMS conferences on nonlinear PDE, UBC, Invited lecture.

Workshop on nonlinear PDE, Ryukoku University, Invited lectures.

Tohoku University, PDE seminar.

Waseda University, Applied Math. seminar.

2002

UC Irvine, Applied math seminar.

AMS regional meeting at Ann Arbor, PDE session.

Peking University, PDE seminar.

GA Tech, CDSNS Colloquium.

Michigan State Univeristy, Applied math seminar.

University of Michigan, Differential equation seminar.

Penn State University, Applied math seminar.

Penn State University, CAM Luncheon seminar.

2003

Purdue University, PDE seminar.

University of California at San Diego, Geometry seminar.

University of California at Irvine, Analysis seminar.

Conference on PDEs and applications, University of Notre Dame

2004

Minicourse in "Mathematical and Computational methods in biology", CIMPA Summer school at Center for scientific studies, Valdivia, Chile.

The Ohio State University, Applied Math. seminar

University of Minnesota, PDE seminar

Huadong PDE workshop at Nanjing University

Workshop on Analysis, Center for Math. Sci., Zhejiang Univ., 2 lectures

USTC, Analysis seminar

Southeast University, informal student seminar

AMS regional meeting, University of Pittsburgh

2005

Workshop on Spatial Ecology, University of Miami

Pan-American Advanced Studies Institute (PASI) on Differential Equations and Nonlinear Analysis, Plenary speaker, Universidad de Chile, Santiago, Chile

Applied math seminar, Iowa State Univeristy

PDE seminar, Michigan State University

PDE seminar, Ohio State University

Workshop on "Toplogical and Variational Methods for Differential Equations", June 26-July 2nd, Invited speaker, Oberwolfach

2006

Century of Excellence Symposium, Feb 16-18, Plenary speaker, Tohoku University

The 7th Northeastern Symposium on Mathematical Analysis, Feb 21-22, Plenary Speaker, Hokkaido Univeristy

Colloquium (joint with Math Biology seminar), Arizona State, March

AMS meeting, Special session of Math. Biology, University of Notre Dame

PDE seminar, GA Tech

AMS meeting, Special session on PDE and applications, Cincinnati

MBI posdoc seminar, Ohio State Univ.

Workshop on Modelling, Analysis, and Computations for Biological Applications, two lectures, Dec 14-15, National Jiao-Tong University, Taiwan

PDE seminar, National Taiwan Normal Univeristy, Taiwan

2007

Workshop on the Mathematics of Global Public Health, Arizona State University, March 7-10.

PDE seminar, Ohio State Univ.

SIAM Student Chapter Talk, University of Tennessee at Knoxville

Applied Math seminar, Beijing University

PDE seminar, Capital Normal University

PDE seminar, Tong-Ji University

PDE seminar, Donghua University

Symposium on "The mathematics of spatial ecology", EcoSummit 2007, Beijing, May 22-27.

Symposium on "Ecology, evolution and modeling of disease dynamics", EcoSummit 2007, Beijing, May 22-27.

The Fourth International Conference on Mathematical Biology, Wuyishan city, Fujian, P.R. China, May 29-June 1.

PDE and Applied Math seminar, University of Chicago

Recent progress on nonlinear elliptic and parabolic problems and related abstract methods, Banff, Oct 8-12, 2007.

First Chile-Japan Workshop on Nonlinear Elliptic and Parabolic PDE, October 23 - 26, 2007, University of Chile.

Analysis seminar, Courant Institute

2008

Colloquium, Univ. of California, Irvine

Applied Math seminar, Univ. of California, Irvine

PDE seminar, University of Minnesota

Colloqiuim, Univ. of Vienna

Workshop on Mathematical and Computational Challenges in PDE Eigenvalue Problems, May 26-28, Beijing

PDE Workshop, July 25-27, Univ. of Iowa

Population genetics workshop, September 28–Oct 3rd, KITP at Santa Barbara

Fields Institute, Applied Math seminar

International Conference on Differential Equations and Applications in Ecology and Epidemiology, Dec 8-10, 2008, Purdue University

International Workshop on Mathematical Biology, Dec 15-16, 2008, National Taiwan Normal University

Taiwan Mathematical Society Annual meeting, Dec 19-21, 2008, National Tsing-Hua University

National Taiwan University, Year End Meeting

National Chung-Cheng University, Taiwan, PDE Seminar

2009

Providence University, Taiwan, PDE Seminar

National Center for Theoretical Science, Tsinghua Universiry, series of lectures on Mathematical Biology

National Central University, PDE seminar

January, 2009