

Curriculum Vitae (updated April 2019)
HERBERT W. HETHCOTE

Home Address: 1866 Commodore Ln NW
 Bainbridge Island, WA 98110-2628
 phone: 206-855-0881 email: herbert-hethcote@uiowa.edu

Former Professional Address: retired in 2006 from Department of Mathematics
 University of Iowa, Iowa City, Iowa 52242
 homepage: <http://www.math.uiowa.edu/~hethcote/>

EDUCATIONAL AND PROFESSIONAL HISTORY

1. Higher Education

University of Michigan, Mathematics, Ph.D., December 1968.

University of Michigan, Mathematics, M.S., June 1965.

Univ. of Colorado, Applied Mathematics, College of Engineering, B.S., June 1964.

2. Professional and Academic Positions

Visiting Professor, February 9-16, 2012, Bhabha Group of Institutions near Kanpur, India, gave 16 lectures in an 8-day Workshop on Mathematical Epidemiology for 22 graduate students.

Visiting Professor, Spring Quarter 2009, Department of Applied Mathematics, University of Washington, taught Mathematical Epidemiology (cross listed as Applied Math 504 and Global Health 590), this course had 18 students with 9 from epidemiology and 5 from applied math.

Visiting Scientist, February 2007, Theoretical Epidemiology, Gulbenkian Institute of Science, Oeiras, Portugal, gave 3 lectures and advised graduate students on their research.

Emeritus Professor, 2006-present; Professor, 1979-2006; Associate Professor, 1973-79; Assistant Professor, 1969-73; Department of Mathematics, University of Iowa

Visiting Professor, Abteilung für Mathematik in den Naturwissenschaften und Mathematische Biologie, Technical University of Vienna, Austria, May-June, 1997

Visitor, Department of Mathematics, University of Hawaii, Honolulu, Hawaii, 1992-93

Visiting Mathematician, Laboratory of Theoretical Biology, National Institutes of Health, Bethesda, Maryland, 1980-81.

Visiting Associate Professor, Department of Mathematics, Oregon State University, Corvallis, Oregon, 1977-78.

Visiting Mathematician, Department of Biomathematics, M.D. Anderson Hospital and Cancer Center, University of Texas, Houston, Texas, 1974-75.

Teaching Assistant in Mathematics, University of Michigan, 1966-68.

GOOGLE SCHOLAR DATA

In April 2019 the public profile of Herbert Hethcote in Google Scholar showed approximately 90 research publications. The total number of citations in other research papers with Herbert Hethcote as the sole author or a coauthor is 14929. Herbert Hethcote retired in 2006 and his last paper was published in 2009. The number of citations in the ten years of 2009 through 2018 is 8651, which is an average of 865 citations per year.

The top twenty publications listed in order of the number of citations through April 19, 2019 are given below. The first paper below is a 54-page paper in a major journal of the Society For Industrial and Applied Mathematics. It has had over 4000 citations in the twenty years since it was published in 2000.

<u>TITLE</u>	<u>CITED BY</u>	<u>YEAR</u>
The mathematics of infectious diseases		
HW Hethcote		
SIAM review 42 (4), 599-653	4080	2000
Abstract. Many models for the spread of infectious diseases in populations have been analyzed mathematically and applied to specific diseases. Threshold theorems involving the basic reproduction number R_0 , the contact number σ , and the replacement number R are reviewed for the classic SIR epidemic and endemic models. Similar results with new expressions for R_0 are obtained for MSEIR and SEIR endemic models with either continuous age or age groups. Values of R_0 and σ are estimated for various diseases including measles in Niger and pertussis in the United States. Previous models with age structure, heterogeneity, and spatial structure are surveyed.		
Gonorrhea transmission dynamics and control		
HW Hethcote, JA Yorke		
Lecture Notes in Biomathematics 56, Springer, Berlin, 105 pages.	910	1984
Qualitative analyses of communicable disease models		
HW Hethcote		
Mathematical Biosciences 28 (3-4), 335-356	699	1976
Dynamical behavior of epidemiological models with nonlinear incidence rates		
W Liu, HW Hethcote, SA Levin		
Journal of Mathematical Biology 25 (4), 359-380	666	1987
Dynamics and control of the transmission of gonorrhea		
JA Yorke, HW Hethcote, A Nold		
Sex Transm Dis 5 (2), 51-56	475	1978
Mutation and childhood cancer: a probabilistic model for the incidence of retinoblastoma		
AG Knudson, HW Hethcote, BW Brown		
Proceedings of the National Academy of Sciences 72 (12), 5116-5120	423	1975
Dynamic models of infectious diseases as regulators of population sizes		
J Mena-Lorca, HW Hethcote		
Journal of Mathematical Biology 30 (7), 693-716	405	1992
Statistical analysis of the stages of HIV infection using a Markov model		
IM Longini Jr, WS Clark, RH Byers, JW Ward, WW Darrow, GF Lemp, ...		
Statistics in medicine 8 (7), 831-843	355	1989
Epidemiological models for heterogeneous populations: proportionate mixing, parameter estimation, and immunization programs		
HW Hethcote, JW Van Ark		

Mathematical Biosciences 84 (1), 85-118	304	1987
Epidemiological models with age structure, proportionate mixing, and cross-immunity		
C Castillo-Chavez, HW Hethcote, V Andreasen, SA Levin, WM Liu		
Journal of mathematical biology 27 (3), 233-258	301	1989
Some epidemiological models with nonlinear incidence		
HW Hethcote, P Van den Driessche		
Journal of Mathematical Biology 29 (3), 271-287	299	1991
A predator–prey model with infected prey		
HW Hethcote, W Wang, L Han, Z Ma		
Theoretical Population Biology 66 (3), 259-268	275	2004
Effects of quarantine in six endemic models for infectious diseases		
H Hethcote, M Zhien, L Shengbing		
Mathematical Biosciences 180 (1-2), 141-160	266	2002
Three basic epidemiological models		
HW Hethcote		
Applied mathematical ecology, 119-144	238	1989
Periodicity in epidemiological models		
HW Hethcote, SA Levin		
Applied mathematical ecology, 193-211	231	1989
An immunization model for a heterogeneous population		
HW Hethcote		
Theoretical population biology 14 (3), 338-349	214	1978
Disease transmission models with density-dependent demographics		
LQ Gao, HW Hethcote		
Journal of Mathematical Biology 30 (7), 717-731	213	1992
A thousand and one epidemic models		
HW Hethcote		
Frontiers in mathematical biology, 504-515	209	1994
Stability of the endemic equilibrium in epidemic models with subpopulations		
HW Hethcote, HR Thieme		
Mathematical Biosciences 75 (2), 205-227	199	1985
Measles and rubella in the United States		
HW Hethcote		
American journal of epidemiology 117 (1), 2-13	191	1983

PH.D STUDENTS (TWELVE) AT THE UNIVERSITY OF IOWA

Omayra Ortega, Ph.D. in 2008 in Applied Mathematical and Computational Sciences; Dissertation: Evaluation of Rotavirus Models with Coinfection and Vaccination.

Roberto Saenz, Ph.D. in 2006 in Applied Mathematical and Computational Sciences; Dissertation: Mathematical Models of Two Species Sharing an Infectious Disease.

Jose Fabian Candelaria, Ph.D. in 2005 in Applied Mathematical and Computational Sciences (jointly supervised with Professor Steve Hendrix in the Department of Biology); Dissertation: Construction and analysis of two habitat specific dispersal models.

Sara Del Valle, Ph.D. in 2005 in Applied Mathematical and Computational Sciences (jointly supervised with Dr. Mac Hyman at Los Alamos National Laboratory); Dissertation: Effects of Behavioral Changes and Mixing Patterns in Mathematical Models for Smallpox Epidemics.

Matt Schuette, Ph.D. in 2000 in Applied Mathematical and Computational Sciences; Dissertation: Modeling the transmission of the varicella-zoster virus.

Jinshi Zhou, Ph.D. in 1995; Dissertation: Disease Transmission Models with Varying Population Sizes.

Linda Qinglin Gao, Ph.D. in 1992; Dissertation: Disease Transmission Models with Density Dependent Demographics.

James W. Van Ark, Ph.D. in 1992; Dissertation: Analysis of Infectious Disease Models for Heterogeneous Populations.

Carlos Espina-Valencia, Ph.D. in 1990; Dissertation: Stability of Equilibria in Some Epidemic Models.

Ann M. Castelfranco, Ph.D. in 1988 in Applied Mathematical Sciences, (jointly supervised with Professor Peter A. Getting in Department of Physiology); Dissertation: Nonlinear Feedback Processes in Models of Neuronal Excitability.

Jaime Mena-Lorca, Ph.D. in 1988; Dissertation: Periodicity and Stability in Epidemiological Models with Disease-Related Deaths.

David W. Tudor, Ph.D. in 1979; Dissertation: Disease Transmission and Control in an Age Structured Population.

POST DOCTORAL VISITORS AT THE UNIVERSITY OF IOWA

From August 6, 2003 to February 1, 2004, Professor Wendi Wang from Southwest Normal University in Chongqing, China was a visiting scholar. During his visit we worked on three papers on epidemiological-ecological models.

From August 20 to November 30, 2003, Professor Linda Q. Gao from North Central College in Naperville, Illinois was a visiting scholar. We worked on comparisons of rubella vaccination strategies in China.

From December 16, 2002 to February 12, 2003, Professor Jaime Mena-Lorca from Catholic University of Valparaiso in Chile was a Visiting Scholar. During his visit we collaborated on research on solutions of epidemiological models with periodic contact rates.

During July-September 2000, Anita Dorfmayr from the Technical University of Vienna was a Visiting Scholar. During her visit we collaborated on research on an HIV/AIDS model with antiretroviral therapy (ART).

SCHOLARSHIP

1. Publications

Co-authors of mathematics papers are considered as equal authors.

a. Refereed

- **Books** (both are now available on my web site)

(H.W. Hethcote and J.W. Van Ark), Modeling HIV Transmission and AIDS in the United States, Lecture Notes in Biomathematics 95, Springer, Berlin, 1992, 234 pages, ISBN 0-387-55904-3.

(H.W. Hethcote and J.A. Yorke), Gonorrhea Transmission Dynamics and Control, Lecture Notes in Biomathematics 56, Springer, Berlin, 1984, 105 pages, ISBN 0-387-13870-6 [still available]

- **Published Articles**

(T. Li, Y. Li, H.W. Hethcote) Periodic traveling waves in SIRS endemic models, *Mathematical and Computer Modelling* 49 (2009) 393-401.

Three chapters (pages 1-128) in *Mathematical Understanding of Infectious Disease Dynamics*, S. Ma and Y. Xia (eds.), Vol. 16 in Lecture Notes Series, Institute for Mathematical Sciences, National University of Singapore, 2008, 240 pages, <https://www.worldscibooks.com/mathematics/7020.html>

(L.Q.Gao, H.W.Hethcote) A mathematical model and projection of various rubella vaccination strategies. *Chinese Journal of Vaccines and Immunization* 14-3 (2008) 193-197 (in Chinese with English abstract).

(S. Del Valle, J.M. Hyman, H.W. Hethcote, and S.G. Eubank) Mixing patterns between age groups in social networks, *Social Networks* 29 (2007) 539–554.

(W. Wang, Y. Li and H.W. Hethcote) Bifurcations in a host-parasite model with nonlinear incidence, *International Journal of Bifurcation and Chaos* 16-11 (2006) 3291-3307.□

(G. Chowell, A. Cintron-Arias, S. Del Valle, F. Sanchez, B. Song, J.M. Hyman, H.W. Hethcote, C. Castillo-Chavez) Mathematical applications associated with the deliberate release of infectious agents, in *Mathematical Studies on Human Disease Dynamics: Emerging Paradigms and Challenges*, A. Gumel, C. Castillo-Chavez, R.E. Mickens, and D.P. Clemence (eds.), Volume 410 in Contemporary Mathematics Series, American Mathematical Society, 2006, 51-71.

(R.A. Saenz, H.W. Hethcote, and G.C. Gray), Confined animal feeding operations as amplifiers of influenza, *Vector-Borne and Zoonotic Diseases* 6 (2006) 338-346.

(L.Q. Gao and H.W. Hethcote) Simulations of rubella vaccination strategies in China, *Mathematical Biosciences* 202 (2006) 371-385.

(R.A. Saenz and H.W. Hethcote) Competing species models with an infectious disease, *Mathematical Biosciences and Engineering* 3 (2006) 219-235.

(H.W. Hethcote, W. Wang, and Y. Li) Species coexistence and periodicity in host-host-pathogen models, *J Math Biology* 51 (2005) 629-660.

(S. Del Valle, H.W. Hethcote, J.M. Hyman, and C. Castillo-Chavez) Effects of Behavioral Changes in a Smallpox Attack Model, *Mathematical Biosciences* 195 (2005) 228-251.

(H.W. Hethcote, W. Wang, L. Han, and Z. Ma) A Predator Prey Model with Infected Prey, *Theoretical Population Biology* 66 (2004) 259-268.

- (A. Van Rie and H.W. Hethcote) Adolescent and adult pertussis vaccination: computer simulations of five new strategies, *Vaccine* 22 (2004) 3154-3165.
- (H.W. Hethcote, P. Horby, and P. McIntyre) Using computer simulations to compare pertussis vaccination strategies in Australia, *Vaccine* 22 (2004) 2181-2191.
- (H.W. Hethcote, Zhien Ma, and Shengbing Liao) Effects of Quarantine in Six Endemic Models for Infectious Diseases, *Mathematical Biosciences* 180 (2002) 141-160.
- New vaccination strategies for pertussis, in *Mathematical Approaches for Emerging and Reemerging Infectious Diseases: An Introduction*, C. Castillo-Chavez, S. Blower, P. van den Driessche, and D. Kirschner (eds.), Volume 125 IMA Series on Mathematics and Its Applications, Springer-Verlag, New York, 2001, 97-118.
- (L. T. Han, Z. Ma, and H.W. Hethcote) Four Predator Prey Models with Infectious Diseases, *Mathematical and Computer Modelling* 34 (2001) 849-858.
- The mathematics of infectious diseases, *SIAM Review* 42 (2000) 599-653. (54 page invited review paper in the primary journal of the Society for Industrial and Applied Mathematics)
- (H.W. Hethcote and P. van den Driessche) Two SIS epidemiologic models with delays, *J. Math. Biol.* 40 (2000) 3-26.
- (H.W. Hethcote, Yi Li, and Zhujun Jing) Hopf bifurcation in models for pertussis epidemiology, *Math. Comp. Modelling* 30-11 (1999) 29-45.
- (M.C. Schuette and H.W. Hethcote) Modeling the effects of varicella vaccination programs on the incidence of chickenpox and shingles, *Bull. Math. Biol.* 61 (1999) 1031-1064
- Simulations of pertussis epidemiology in the United States: Effects of adult booster doses, *Math. Biosci.* 158 (1999) 47-73.
- Oscillations in an endemic model for pertussis, *Canad. Appl. Math. Quart.*, 6 (1998) 61-88.
- An age-structured model for pertussis transmission, *Math. Biosci.* 145 (1997) 89-136.
- Mathematical modeling of pertussis epidemiology, *Z. Angew. Math. Mech.* 76:Suppl.2 (1996) 429-432.
- (L. Gao, J. Mena-Lorca and H.W. Hethcote) Variations on a theme of SEI endemic models, In *Differential Equations and Applications to Biology and to Industry*, M. Martelli et. al. (eds.), World Scientific, Singapore, 1996, 191-207.
- Modeling heterogeneous mixing in infectious disease dynamics, In *Models for Infectious Human Diseases*, V. Isham and G.F.H. Medley, (eds.), Cambridge University Press, Cambridge, 1996, 215-238.
- (L. Gao, J. Mena-Lorca and H.W. Hethcote) Four SEI endemic models with periodicity and separatrices, *Math. Biosci.* 128 (1995) 157-184.
- (H.W. Hethcote and P. van den Driessche) An SIS epidemic model with variable population size and a delay, *J. Math. Biol.* 34 (1995) 177-194.
- (V. Roudferfer, N. Becker and H.W. Hethcote) Waning immunity and its effects on vaccination schedules, *Math. Biosci.*, 124 (1994) 59-82.
- A thousand and one epidemic models, In *Frontiers in Mathematical Biology*, S. Levin, ed., *Lecture Notes in Biomathematics* 100, Springer, Berlin, 1994, 504-515.
- (J. Zhou and H.W. Hethcote) Population size dependent incidence in models for diseases without immunity, *J. Math. Biol.* 32 (1994) 809-834.

- Modeling AIDS prevention programs in a population of homosexual men, In *Modeling the AIDS Epidemic: Planning, Policy and Prediction*, E.H. Kaplan and M.L. Brandeau, {eds.}, Raven Press, New York, 1994, 91-107.
- (X. Lin, H.W. Hethcote and P. van den Driessche) An epidemiological model for HIV/AIDS with proportional recruitment, *Math. Biosci.* 118 (1993) 181-195
- (J. Mena-Lorca and H.W. Hethcote) Dynamic models of infectious diseases as regulators of population sizes, *J. Math. Biology* 30 (1992) 693-716.
- (L.Q. Gao and H.W. Hethcote) Disease transmission models with density dependent demographics, *J. Math. Biology* 30 (1992) 717-731.
- (H.W. Hethcote and J.W. Van Ark) Weak linkage between HIV epidemics in homosexual men and intravenous drug users in New York City, In *AIDS Epidemiology: Methodological Issues*, N.P. Jewell, K. Dietz and V.T. Farewell, {eds.}, Birkhauser, Boston Basel Berlin, 1992, 174-208.
- (H.W. Hethcote and P. van den Driessche) Some epidemiological models with nonlinear incidence, *J. Math. Biology* 29 (1991) 271-287.
- (H.W. Hethcote, J.W. Van Ark and I.M. Longini) A simulation model of AIDS in San Francisco I: Model formulation and parameter estimation, *Math. Biosci.* 106 (1991) 203-222.
- (H.W. Hethcote, J.W. Van Ark and J.M. Karon) A simulation model of AIDS in San Francisco II: Simulations, therapy and sensitivity analysis, *Math. Biosci.* 106 (1991) 223-247.
- (S.J. Schwager, C. Castillo-Chavez and H.W. Hethcote) Statistical and mathematical approaches in HIV/AIDS Modeling: A review, In *Mathematical and Statistical Approaches to AIDS Epidemiology*, C. Castillo-Chavez, {ed.}, Lecture Notes in Biomathematics 83, Springer, Berlin Heidelberg New York, 1989, 2-37
- (H.W. Hethcote, M.A. Lewis and P. van den Driessche) An epidemiological model with a delay and a nonlinear incidence rate, *J. Math. Biology* 27 (1989) 49-64.
- (C. Castillo-Chavez, H.W. Hethcote, V. Andreasen, S.A. Levin and W.M. Liu) Epidemiological models with age structure, proportionate mixing, and cross-immunity, *J. Math. Biology* 27 (1989) 233-258.
- (I.M. Longini, W.S. Clark, R.H. Byers, G.F. Lemp, J.W. Ward, W.W. Darrow and H.W. Hethcote) Statistical analysis of stages of HIV infection using a Markov model, *Stat. in Med.* 8 (1989) 831-843.
- Three basic epidemiological models, In *Applied Mathematical Ecology*, L. Gross, T.G. Hallam and S.A. Levin, {eds.}, Springer, Berlin, 1989, 119-144.
- Rubella, In *Applied Mathematical Ecology*, L. Gross, T.G. Hallam and S.A. Levin, {eds.}, Springer, Berlin, 1989, 212-234.
- (H.W. Hethcote and S.A. Levin) Periodicity in epidemiological models, In *Applied Mathematical Ecology*, L. Gross, T.G. Hallam and S.A. Levin, {eds.}, Springer, Berlin, 1989, 193-211.
- A Model for HIV transmission and AIDS, In *Mathematical Approaches to Problems in Resource Management and Epidemiology*. C.Castillo-Chavez, S.A. Levin and C. Shoemaker {eds.} Lecture Notes in Biomathematics 81, Springer, Berlin, 1989, 164-176.
- Optimal ages of vaccination for measles, *Math. Biosci.* 89 (1988) 29-52.
- (C. Castillo-Chavez, H.W. Hethcote, V. Andreasen, S.A. Levin and W.M. Liu) Cross immunity in the dynamics of homogeneous and heterogeneous populations, In *Mathematical Ecology*, T.G. Hallam, L. Gross and S. A. Levin, {eds.}, World Scientific Publishing., Singapore, 1988, 303-316.

(C. DeLisi and H.W. Hethcote) Chromatographic theory and application to quantitative affinity chromatography, In *Analytical Affinity Chromatography*, I.M. Chaiken, {ed.}, CRC Press, Boca Raton, Florida, 1987, 1-63.

(H.W. Hethcote and J.W. Van Ark) Epidemiological models for heterogeneous populations: Proportionate mixing, parameter estimation and immunization programs, *Math. Biosci.* 84 (1987) 85-118.

(W.M. Liu, H.W. Hethcote and S.A. Levin) Dynamical behavior of epidemiological models with nonlinear incidence rates, *J. Math. Biology* 25 (1987) 359-380.

AIDS modelling work in the USA, In *Future Trends in AIDS*, Her Majesty's Stationery Office, London, 1987, 35-41.

(D.S. Hage, R.R. Walters and H.W. Hethcote) Split-peak affinity chromatographic studies of the immobilization-dependent absorption kinetics of protein A, *Analytical Chemistry* 58 (1986) 274-279.

A vaccination model for an endemic disease with maternal antibodies in infants, In *Mathematics and Computers in Biomedical Applications*, J. Eisenfeld and C. DeLisi, {eds.}, North-Holland, Amsterdam, 1985, 283-286.

(H.W. Hethcote and H.R. Thieme) Stability of the endemic equilibrium in epidemic models with subpopulations, *Math. Biosci.* 75 (1985) 205-227.

(H.W. Hethcote and C. Delisi) Determination of equilibrium constants and deductions on transductive mechanisms from functional response inhibition studies, in *Cell Surface Dynamics*, A.S. Perelson, C. DeLisi, and F.W. Wiegel, {eds.}, Marcel Dekker, New York, 1984, 383-404.

Measles and rubella in the United States, *Am. J. Epidemiol.* 117 (1983) 2-13.

(H.W. Hethcote and C. DeLisi) Quantitative affinity chromatography: New methods for kinetic and thermodynamic characterizations of macromolecular interactions, In *Affinity Chromatography and Biological Recognition*, I.M. Chaiken, M. Wilchek, I. Parikh, {eds.}, Academic Press, Orlando, 1983, 119-134.

(H.W. Hethcote, J.A. Yorke and A. Nold) Gonorrhoea modeling: A comparison of control methods, *Math. Biosci.* 58 (1982) 93-109.

(C. DeLisi and H.W. Hethcote) A theory of column chromatography for sequential reactions in heterogeneous nonequilibrium systems: application to antigen-antibody reactions, In *Affinity Chromatography and Related Techniques*, T.C.J. Gribnau, J. Visser and R.J.F. Nivard, {eds.}, Elsevier, Amsterdam, 1982, 63-78 (expository chapter; reviewed by Editor and referees).

(H.W. Hethcote and C. DeLisi) A nonequilibrium model of liquid column chromatography I: Exact expressions for elution profile moments and relation to plate height theory, *J. Chromatography* 240 (1982) 269- 281.

(C. DeLisi, H.W. Hethcote and J.W. Brettler) A nonequilibrium model of liquid column chromatography II: Explicit solutions and nonideal conditions, *J. Chromatography* 240 (1982) 283-295.

(H.W. Hethcote and C. DeLisi) Determination of equilibrium and rate constants by affinity chromatography, *J. Chromatography* 248 (1982) 183-202.

(H.W. Hethcote, H.W. Stech and P. van den Driessche) Nonlinear oscillations in epidemic models, *SIAM J. Appl. Math.* 40 (1981) 1-9.

(H.W. Hethcote, H.W. Stech and P. van den Dreissche) Periodicity and stability in epidemic models: A survey, In *Differential Equations and Applications in Ecology, Epidemics and Population Problems*, Claremont Conference Proceedings, S. Busenberg and K. Cooke, {eds.}, Academic Press, New York, 1981, 65-82 (survey article; reviewed by Editor and a referee).

- (H.W. Hethcote, H.W. Stech and P. van den Dreissche) Stability analysis for models of diseases without immunity, *J. Math. Biology* 13 (1981) 185-198.
- (H.W. Hethcote and D.W. Tudor) Integral equation models for endemic infectious diseases, *J. Math. Biology* 9 (1980) 37-48.
- (J.A. Yorke, H.W. Hethcote and A. Nold) Dynamics and control of the transmission of gonorrhea, *Sexually Transmitted Diseases* 5 (1978) 51-56.
- (H.W. Hethcote and A.G. Knudson, Jr.) A model for the incidence of embryonal cancers: Application to retinoblastoma, *Proc. Nat. Acad. Sci. U.S.A.* 75 (1978) 2453-2457.
- An immunization model for a heterogeneous population, *Theor. Pop. Biol.* 14 (1978) 338-349.
- Schwarz lemma analogues for harmonic functions, *Internat. J. Math. Educ. Sci. Technol.* 8 (1977) 65-67.
- Mutational models of carcinogenesis, In *Environmental Health: Qualitative Methods*, SIAM Utah Conference Proceedings, A. Whittemore, {ed}., SIAM, Philadelphia, 1977, 172-182.
- Qualitative analyses of communicable disease models, *Math. Biosci.* 28 (1976) 335-356.
- (H.W. Hethcote, J.S. McLarty and H.D. Thames, Jr.) Comparison of mathematical models for radiation fractionation, *Radiation Research* 67 (1976) 387-407.
- Mathematical models for the spread of infectious diseases, in *Epidemiology*, SIMS Utah Conference Proceedings, D. Ludwig and K.L. Cooke, {eds}., SIAM, Philadelphia, 1975, 122-131 (survey article; reviewed by Editor and a referee).
- (A.G. Knudson, Jr., H.W. Hethcote and B.W. Brown) Mutation and childhood cancer: A probabilistic model for the incidence of retinoblastoma, *Proc. Nat. Acad. Sci. U.S.A.* 72 (1975) 5116-5120.
- Deterministic models for infectious diseases, In *Mathematical Models in the Undergraduate Curriculum*, Indiana University Conference Proceedings, D.P. Maki and M. Thompson, {eds}., 1975, 191-224.
- Asymptotic behavior and stability in epidemic models, in *Mathematical Problems in Biology*, P. van den Dreissche, {ed}., *Lecture Notes in Biomathematics* 2, Springer, Berlin, 1974, 83-92.
- (H.W. Hethcote and P. Waltman) Optimal vaccination schedules in a deterministic epidemic model, *Math. Biosci.* 18 (1973) 365-382.
- (H.W. Hethcote and P. Waltman) Theoretical determination of optimal treatment schedules for radiation therapy, *Radiation Research* 56 (1973) 150-161.
- Asymptotic behavior in a deterministic epidemic model, *Bull. Math. Biol.* 35 (1973) 607-614.
- Geometric existence proofs for nonlinear boundary value problems, *SIAM Rev.* 14 (1972) 121-128.
- (H.W. Hethcote and A.J. Schaeffer) A computer laboratory course for calculus and linear algebra, *Amer. Math. Monthly* 79 (1972) 290-293 (mathematics education article; reviewed by Editor and a referee).
- Note on determining the limiting susceptible population in an epidemic model, *Math. Biosci.* 9 (1970) 161-164.
- Error bounds for asymptotic approximations of zeros of Hankel functions occurring in diffraction problems, *J. Mathematical Phys* II (1970) 2501-2504.
- Bounds for zeros of some special functions, *Proc. Amer. Math. Soc.* 25 (1970) 72-74.
- Error bounds for asymptotic approximations of zeros of transcendental functions, *SIAM J. Math Anal.* I (1970) 147-152.
- (H.W. Hethcote and D. Korts) Stability theory, *Colorado Engineer* 59-1 (1962) 25-27.

2. Peer Recognition of Research

I was invited to write a review article on infectious disease modeling by the Editors of the journal SIAM Review. It is the only SIAM journal distributed to all 8000 members of the Society for Industrial and Applied Mathematics. The 54 page article titled "The mathematics of infectious diseases" appeared in the December 2000 issue of the journal SIAM Review. This article reviews and unifies previous work, and contains new results on estimation methods for the basic reproduction number.

I was invited to make a five-week lecture tour in China in March and April 1999, where I gave a 6 hour short course, a 10 hour short course, and 3 colloquium talks at 5 universities. In July-August 2000 I was invited back to China to give five invited 2 hour lectures in the Workshop on Mathematical Epidemiology and Population Dynamics at Xi'an Jiaotong University in Xi'an, China.

GRANTS

a. External

Research Contract (pertussis vaccination modeling) Aventis Pasteur, Lyon, France, (\$37,646, direct, \$9,411 indirect), PI, 2000-2001

Research Contract (pertussis modeling), Postgraduate Institute of Medicine, (\$5000 direct honorarium), PI, 1999

Research Contract (pertussis modeling), Centers for Disease Control, (\$21,885 direct, \$2,190 indirect), PI, 1994-95

Research Contract (HIV/AIDS modeling), Centers for Disease Control, (\$182,364 direct, \$71,123 indirect), PI, 1987-91

Research Contract, Centers for Disease Control (co-PI with J.A. Yorke), 1980-81

NIH Research Grant (co-PI with J.A. Yorke), 1977-80

Research Contract, Centers for Disease Control (co-PI with J.A. Yorke), 1976-77

b. Internal

International Travel Grant for professional visit to China (\$220 direct), 2000

nTITLE grant for learning web technology, University of Iowa, (\$3,000 direct), 2000

International Travel Grant for professional visit to China (\$700 direct), 1999

Course Development Grant, University of Iowa, Summer 1972

Summer Research Grants (Old Gold Fellowships), University of Iowa, 1971, 1973

Summer Research Grant (Project Themis), University of Iowa, 1970

Postdoctoral Research Fellowship, University of Iowa, January-August, 1969

Invited Lectures and Conference Presentations (since 2000)

a. International

2012

January 22-February 6, gave talks at IIT Kanpur, University of Lucknow, Benares University in Varanasi, ITM University in Gwalior, and Jiwaji University in Gwalior in India.

February 17, gave a lecture in Conference on Mathematical Modeling and Computer Simulations with Applications, Bhabha Group of Institutions near Kanpur, India.

2007

February 23, seminar on Modeling the Effects of Varicella Vaccination, Director-Geral da Saude, Lisbon, Portugal

February 1-28, gave 3 lectures and advised graduate students on their research, Theoretical Epidemiology, Gulbenkian Institute of Science, Oeiras, Portugal

2005

August 15-19, gave keynote address and four tutorial lectures, Mathematical Modeling of Infectious Diseases: Dynamics and Control, National University of Singapore

August 20-25, co-organizer of Mathematical Epidemiology workshop, Banff International Research Station, Banff, Alberta, Canada

2004

June 21-25, session organizer and speaker, MPD-DestoBio Conference on Computational and Mathematical Population Dynamics, Trento, Italy

November 29 – December 3, three talks on epidemiology modeling, Fundacao Oswaldo Cruz (Brazilian National Institutes of Health), Rio de Janeiro, Brazil

2003

September 5-6, invited participant in workshop: Qualitative Analysis for the Outbreak and Control of SARS and Other Infectious Diseases, Banff International Research Station, Alberta, Canada

2002

March 12-24, visitor at the National Centre for Epidemiology and Population Health at Australian National University, Canberra. March 21 seminar on "Using infectious disease transmission models in making decisions about disease control."

April 15-19, 8 hours of lectures in Short Course on Epidemic Modelling, University of Trento, Italy

2001

May 7-13, invited speaker in Pertussis Modeling Workshop, Barcelona, Spain

2000

July 24 - August 11, five invited 2 hour lectures in Workshop on Mathematical Epidemiology and Population Dynamics, Xi'an Jiaotong University, Xi'an, China

August 13, invited colloquium talk on Epidemiology Models with Delays at Tongji University in Shanghai, China

October 15-20, invited participant in Global Meeting on Pertussis Surveillance, World Health Organization, Geneva, Switzerland

b. National2006

April 10, two invited talks at Mathematics Retreat Day, University of Wisconsin – Eau Claire

2004

February 6, invited colloquium in Department of Mathematics, Purdue University

March 15, invited seminar in Department of Epidemiology, University of North Carolina

April 9, invited Mathematical Science Colloquium, Portland State University

May 19, invited DIMACS/BIOMAPS Seminar, Rutgers University

May 17-21, co-organizer and speaker, DIMACS Working Group on Methodologies for Comparing Vaccination Strategies, Rutgers University (38 participants)

September 28, invited colloquium in Department of Mathematics, Iowa State University

2003

February 26, invited colloquium in Department of Mathematics, University of Memphis

June 30-July 1, invited presentation in conference on Computational and Mathematical Approaches to Homeland Security and Public Health Policy, Los Alamos National Laboratory, New Mexico

2002

February 14, invited colloquium in Department of Mathematics, Texas Tech University, Lubbock

February 15, invited colloquium sponsored by Departments of Mathematics and Biology, University of Texas at Arlington

February 21, invited colloquium sponsored by Departments of Mathematics, Computer Science, and Biology, Georgia Southern University, Statesboro, Georgia

March 5-10, session presentation and participant at SIAM Conference on the Life Sciences, Boston, Massachusetts

June 24-27, co-organizer and 8 hours of lectures in DIMACS Summer School Tutorial on Dynamic Models of Epidemiological Problems, Rutgers University, Piscataway, New Jersey (75 participants)

June 28-July 2, invited talk and participant at DIMACS International Conference on Computational and Mathematical Epidemiology, Rutgers University, Piscataway, New Jersey

October 24-25, invited speaker in Pertussis Modeling Workshop, New York City

2001

October 19-21, speaker and scientific advisory committee, International Conference on Compartmental Models and Disease Transmission, Ann Arbor, Michigan

2000

September 12-13, two invited lectures at Infectious Disease Modeling Workshop, MITRE Corporation, McLean, Virginia, (for National Intelligence personnel concerned about infectious diseases as bioterrorism agents and infectious diseases in troops deployed in other countries)

SERVICE

1. Department (last 5 years at University of Iowa)

Elected to the Executive Committee, 2000-03

Appointed to M.S. Examination Committee, 2001-2004

Appointed to *ad hoc* Self Study Committee 2001

Appointed to *ad hoc* Minority Student Recruitment and Development Committee, 2001-2005

Appointed to *ad hoc* Salary Advisory Committee, 2000 and 2001

Appointed to *ad hoc* Peer Evaluation Committees: Richard Baker, 2001; Weimin Han, 2004; Tong Li, 2004; Isabel Darcy, 2004

Appointed as Chair of *ad hoc* Committee on Departmental Standards for Tenured Faculty Review, 2003

Appointed to *ad hoc* VIGRE Proposal Committee, 2003 & 2004
 Appointed as Chair of the Library Committee, 1996-2005

Appointed to Mathematical Biology Search Committee, 2003 & 2004 & 2005

Elected to Hiring Committee, 2003

2. College

Academic Review Committee for Geography Department (2003)

3. University

Chairman, Program in Applied Mathematical and Computational Sciences, University of Iowa, 1982-2005. As Chairman of the interdisciplinary AMCS program, I recruited potential students, screened applicants, advised current students on courses and dissertation supervisors, arranged Ph.D. comprehensive examinations and final dissertation examinations, maintained standards, allocated block funds from the Graduate College to the students, organized the AMCS seminar, and maintained records. Although this interdisciplinary program is directly under the Graduate College, it works cooperatively with the Department of Mathematics. The Graduate College gave a Teaching Assistantship to the Department of Mathematics as a partial teaching replacement to compensate for my administrative duties as Chairman of this interdisciplinary Ph.D. program.

Academic Review Committee for Mechanical and Industrial Engineering Department (2004)

Iowa Informatics Initiative Proposal Review Committee 2002

Funded Retirement and Insurance Committee (FRIC, 1995-2004)

Faculty Scholar Review Committee (2000-2001)

Panel of Faculty for AGEP students, December 4, 2003

Research Roundtable Facilitator at CIC SROP Conference, July 10, 2004

4. Profession

Editorial Board of the journal, Mathematical Biosciences, 1982-2005

Associate Editor of IMA J. Math. Appl. Med. Biol., 1996-2001

Editorial Board of Society for Industrial and Applied Mathematics J. Appl. Math., 1995-2001.

Reviewer for NSF, NIH, NSERC, Wellcome Trust, Michael Smith Foundation, South Dakota Biocomplexity Grants (6 proposals reviewed in 2002-2004).

External evaluator for promotions to Associate Professor and Professor at other universities (5 letters written in 2002-2004).

Member of NIH Study Section on Models for Infectious Disease Agent Study (MIDAS), November 2003

Referee (14 papers refereed in 2002-2004) for SIAM J. Appl. Math, J. Diff. Eqns., J. Math. Biology, Math. Biosci., J. Theor. Biology, Bull. Math. Biol., Theor. Pop. Biology, Science, Am. J. Epidemiol., Sexually Transmitted Diseases, Nature, Mathematical Modelling, J. AIDS, Appl. Math. Letters

In 2001 my review of the book Mathematical Epidemiology of Infectious Diseases by Diekmann and Heesterbeek was published in the journal SIAM Review 43, pp 424-425.

I was a co-organizer with Simon Levin (Cornell University) and Pauline van den Driessche (University of Victoria) of the Epidemiology Modeling Workshop on August 20-25, 2005 at the Banff International Research Station. A primary objective of the workshop is to encourage communication among 40 internationally-recognized applied mathematicians, statisticians, epidemiologists, and public health officials. Plenary talks will be followed by other talks and discussion periods about challenges and opportunities for modeling to contribute to public health policy. See http://www.pims.math.ca/birs/birspages.php?task=displayevent&event_id=05w5003

I was a co-organizer with John Glasser (Centers for Disease Control) of the DIMACS Working Group on Methodologies for Comparing Vaccination Strategies at Rutgers University on May 17-20, 2004. Speakers focused on applications or reformulation of residual problems on whose solution participants might collaborate. There was extensive follow-up discussion among the 38 participants, especially on vaccine-preventable diseases with similar biology or policy questions. See <http://dimacs.rutgers.edu/Workshops/WGVaccination/>

I organized the Iowa Biomathematics Conference on November 17-20, 2003. This conference was coordinated with the visit of Professor Carlos Castillo-Chavez from Cornell University as a Distinguished Visitor in the Department of Mathematics. There were 6 talks and a poster session with 5 poster presentations. This conference provided the opportunity for research presentations by graduate students and Visiting Scholars from University of Iowa, Cornell University, Arizona State University, Southwest China Normal University, and North Central College. We also had three social events for conference speakers and University of Iowa graduate students.

While I was in China in April 1999 at Xi'an Jiaotong University, we prepared a Memorandum of Understanding between their Department of Applied Mathematics and the UI Program in Applied Mathematical and Computational Sciences. This agreement was signed by the chairs and deans at these universities. The purposes of this agreement are: to promote mutually beneficial research, especially in mathematical epidemiology, to encourage the exchange of visiting scholars, and to encourage Xi'an students to pursue Applied Mathematics PhDs at the University of Iowa. As part of this agreement, I returned to Xi'an in August 2000 to give 3 lectures and run 2 workshops in a conference on Workshop on Mathematical Epidemiology and Population Dynamics. Also Professors Kaitai Li from Xi'an visited UI in May 2000 and Professor Dongsheng Li was a Visiting Professor in Spring 2005. AMCS and the Department of Mathematics have numerous graduate students who came from Xi'an Jiaotong University.

5. Community

Two talks on "The Mathematics of Global Positioning System (GPS) Receivers" and "Mathematical Modeling of Infectious Diseases" at West High School in Iowa City, Iowa on May 15, 2000