

**Curriculum Vitae (August 2009)**  
**HERBERT W. HETHCOTE**

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

**Former Business 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**

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

Visiting Lecturer, Mathematical Epidemiology course, Departments of Applied Mathematics and Global Health, University of Washington, Spring Quarter, 2009,  
<http://www.amath.washington.edu/courses/504-spring-2009/AMATH.html>

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.

### **3. Honors and Awards**

Sloan Foundation minority Ph.D. student mentor, 2003-2006

Cornell University Award: "Cornell University expresses its deep gratitude for your outstanding contributions in support of underrepresented minorities in the mathematical sciences." May 2000

NSF Graduate Fellowship, 1964-66; NSF Research Assistantship, 1968

NSF Undergraduate Research Grant, Summer 1962

Tau Beta Pi (Engineering Honor Society), 1962 (President, 1963-64)

### **4. Memberships**

Society for Industrial and Applied Mathematics      Society for Mathematical Biology

Mathematical Association of America      American Mathematical Society (until 2006)

## TEACHING AT THE UNIVERSITY OF IOWA

### 1. Ph.D. Students Supervised (twelve)

Omayra Ortega, Ph.D. in 2008 in Applied Mathematical and Computational Sciences; Dissertation: Evaluation of Rotavirus Models with Coinfection and Vaccination. Now an Assistant Professor at Arizona State University: West Campus

Roberto Saenz, Ph.D. in 2006 in Applied Mathematical and Computational Sciences; Dissertation: Mathematical Models of Two Species Sharing an Infectious Disease. Now at a postdoctoral position at Cambridge University in England.

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. Now Assistant Professor at Cornell College in Mount Vernon, Iowa.

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. Now a postdoctoral fellow at Los Alamos National Laboratory.

Matt Schuette, Ph.D. in 2000 in Applied Mathematical and Computational Sciences; Dissertation: Modeling the transmission of the varicella-zoster virus. Now Assistant Professor at Georgia Southern University, Statesboro, Georgia.

Jinshi Zhou, Ph.D. in 1995; Dissertation: Disease Transmission Models with Varying Population Sizes. Now a statistical consultant at Quintiles, Inc. in Kansas City Missouri.

Linda Qinglin Gao, Ph.D. in 1992; Dissertation: Disease Transmission Models with Density Dependent Demographics. Now Professor in Department of Mathematics at North Central College, Naperville, Illinois.

James W. Van Ark, Ph.D. in 1992; Dissertation: Analysis of Infectious Disease Models for Heterogeneous Populations. Now Associate Professor at University of Detroit-Mercy, Detroit, Michigan.

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. Now a Research Associate in Bekesy Lab/PBRC at University of Hawaii, Honolulu, Hawaii.

Jaime Mena-Lorca, Ph.D. in 1988; Dissertation: Periodicity and Stability in Epidemiological Models with Disease-Related Deaths. Now a Professor of Mathematics and Chairman at Catholic University of Valparaiso, Valparaiso, Chile.

David W. Tudor, Ph.D. in 1979; Dissertation: Disease Transmission and Control in an Age Structured Population. Now a Professor of Business at NCC Education, Mulhouse, France.

### 2. Other Contributions to Instructional Programs (recent)

Prof. Ira Longini at the University of Washington asked me to teach a course in Mathematical Epidemiology in Spring Quarter 2009. This course was cross listed as Applied Math 504 and Global Health 590. The course had 18 students with 9 from epidemiology, 5 from applied math, and 1 each from biostatistics, stat, sociology, and ecology. For details, see <http://www.amath.washington.edu/courses/504-spring-2009/AMATH.html>

I supervised the PhD dissertation research of Omayra Ortega, who finished in 2008. She had an Alfred P. Sloan Foundation Dissertation Fellowship while at the University of Iowa and is now an Assistant Professor at Arizona State University West. Roberto Saenz received his PhD in summer of 2006 and is now a post-doctoral fellow at Cambridge University. Sara Del Valle and Fabian Candelaria, who graduated with PhDs in summer of 2005, also had Alfred P. Sloan Foundation Dissertation Fellowships.

I was a co-organizer with Simon Levin (Princeton University) and Pauline van den Driessche (University of Victoria) of the Workshop on Epidemiology Modeling at the Banff International Research Station in Banff, Canada on August 21-25, 2005. One goal of this 40 person workshop was to encourage communication among internationally-recognized applied mathematicians, statisticians, epidemiologists, and public health officials. There were presentations of the latest results on the theory and applications of mathematical modeling of infectious disease epidemiology and control. Participants were very positive about the long discussion periods following each lecture.

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.

## **SCHOLARSHIP**

### **1. Publications**

- **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.

- **Published Articles since 1991**

(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) Dynamics 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.

## **2. Invited Lectures and Conference Presentations (2000-2007)**

### **a. International**

#### 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. National**

## 2006

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 (2000-2006)**

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  
ointed 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 AGEF 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](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.

#### **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