

## **ROBERTS, FRED S.**

Birthdate: 19 June 1943

**Education:** A.B., Summa Cum Laude, Mathematics, Dartmouth College, 1964  
M.S., Mathematics, Stanford University, 1967  
Ph.D., Mathematics, Stanford University, 1968

### **Current Positions:**

Distinguished Professor of Mathematics, Rutgers University, 1981 ...  
Director Emeritus and Senior Advisor, Center for Discrete Mathematics and Theoretical Computer Science (DIMACS) (founded as an NSF Science and Technology Center and a Consortium of Princeton, Rutgers, AT&T Labs, Bell Labs, NEC Research Institute, Applied Communications Systems, and Cancer Institute of NJ), September 2011 ...  
Director, Command, Control, and Interoperability Center for Advanced Data Analysis (CCICADA) (a DHS university center of excellence and a consortium of Rutgers University, Carnegie-Mellon University, City College of New York, Howard University, Morgan State University, Princeton University, Rensselaer Polytechnic Institute, Texas Southern University, Tuskegee University, University of Illinois-Urbana Champaign, U-MASS Lowell, University of Medicine and Dentistry of NJ, University of Southern California, Applied Communications Sciences, AT&T Labs, Bell Labs, TerraGo Technologies), April 2009 ...  
Fellow (Member), Rutgers Center for Operations Research, 1982 ...  
Member of Rutgers Graduate Faculties in Mathematics, Operations Research, Computer Science, Computational Molecular Biology, Quantitative Biomedicine, Industrial and Systems Engineering, and Education

### **Past Positions:**

Postdoctoral Fellow in Mathematical Psychology, Department of Psychology, University of Pennsylvania, 2/1968-6/1968  
Professional Staff, Department of Mathematics, The RAND Corp., Santa Monica, CA, 6/1968-9/1971  
Institute for Advanced Study, Princeton, NJ, 9/1971-8/1972  
Associate Professor of Mathematics, Rutgers University, 1972-1976  
Professor of Mathematics, Rutgers University, 1976-1981  
Visiting Professor, School of Operations Research & Industrial Engineering, Cornell University, Ithaca, NY, 1979-1980  
Director, Rutgers Center for Operations Research, 1982-1983  
Visitor, AT&T Bell Laboratories, Murray Hill, NJ 9/1986-1/1987 and 10/1987-2/1988  
Associate Director, Center for Discrete Mathematics and Theoretical Computer Science (DIMACS), 7/1989-8/1992  
Robert G. Stone Visiting Professor of Mathematics (part-time), Northeastern University, 1/1990-6/1995  
Acting Director, Center for Discrete Mathematics and Theoretical Computer Science (DIMACS), 1/1991-6/1991, 8/1992-8/1993  
Director, Center for Discrete Mathematics and Theoretical Computer Science (DIMACS),

1/1996-8/2011

Director, Homeland Security Center for Dynamic Data Analysis (DyDAn) (a consortium of Rutgers, Princeton, Rensselaer Polytechnic Institute, Texas Southern University, Texas State University-San Marcos, AT&T Labs, and Bell Labs), 2006-2009

**Major Research Interests:**

Mathematical models in the social, behavioral, biological and environmental sciences and of problems of communications and transportation; graph theory and combinatorics; measurement theory; operations research; utility, decisionmaking, and social choice; mathematical modeling and decisionmaking for homeland security.

**Honors and Awards:**

Daniel Webster National Scholar, 1961-1964

Woodrow Wilson Fellow, 1964-1965

Carl N. Jacobs Lecturer, University of Wisconsin, Stevens Point, 1975

Sigma Xi Lecturer, Swarthmore College, 1976

CBMS-NSF Research Conference Lecturer, Colby College, 1977

Nominated for President of SIAM (Society for Industrial and Applied Mathematics), 1981  
(lost the election)

Outstanding Mathematician Lecturer, University of New Haven, 1983

Humboldt Fellowship (declined), 1984

Elected Vice President of SIAM, 1984, 1986

ACM/SIGACT Distinguished Service Prize, 1999

University Research Initiative Award, Air Force Office of Scientific Research, 1989-1993

Robert G. Stone Chair, Northeastern University, 1990-1995

NSF Science and Technology Centers Pioneer Award from National Science Foundation,  
2001

Commemorative Medal of the Union of Czech Mathematicians and Physicists, Mathematics  
Research Section, October 2003

Fellow, American Mathematical Society, 2012

Docteur Honoris Causa, University of Paris-Dauphine, June 2013

**Grants:**

NSF Grants, 1972-1979, 1983 ...  
 AFOSR Grants, 1979-1983, 1985-1996  
 ONR Grants, 1993-2003, 2005-2012  
 ARO Grants, 2011-2012  
 DHS Grants, 2006 ...  
 NCHGR Grants, 1995-1998  
 NSA Grants, 1995-2003, 2006, 2008  
 DARPA Grants, 1996-2001  
 Sloan Foundation Grants, 1999-2004  
 AT&T Foundation Grants, 2000-2004  
 Burroughs Wellcome Fund Grants, 2002-2004, 2006

**Recent Grants (since 1999):**

“DIMACS Special Year on Computational Intractability”  
 NSF (CCF), \$252,734  
 September 15, 1999 - August 31, 2001

“DIMACS Special Focus on Next Generation Network Technologies and Applications”  
 ONR, \$150,000  
 January 1, 2000 – September 30, 2001

“Workshops in DIMACS Special Year in Computational Intractability”  
 NSA, \$10,000  
 January 24, 2000 - January 23, 2001

“DIMACS Connect Institute”  
 AT&T Foundation, \$90,000  
 June 1, 2000 - May 31, 2003

“DIMACS Connect Institute”  
 NSF (EHR), \$766,292  
 June 1, 2000 - May 31, 2004

“DIMACS Special Year on Computational Molecular Biology”  
 NSF (DBI), \$105,061  
 July 1, 2000 - June 30, 2004

“Wireless Technologies and Applications”  
 NSA, \$39,998  
 August 7, 2000 - August 6, 2001

“DIMACS Special Focus on Mathematics and the Foundations of Computer and Information Science”  
 NSF (DMS), \$120,000  
 September 1, 2000 - August 31, 2003

“Special Focus in Computational Molecular Biology”  
 Alfred P. Sloan Foundation, \$361,778  
 September 1, 2000-August 31, 2003

“Three Special Focus Programs at DIMACS”  
 NSF (CCR), \$3,788,255  
 September 1, 2000 - August 31, 2008

“Ubiquitous Networking/Fine-Grained Networking”

- DARPA, \$60,000  
October 1, 2000 - August 31, 2001  
“Special Projects: DIMACS Workshop: Complexity in Biosystems: Innovative Approaches at the Interface of Experimental Modeling and Computational Simulation”  
NSF (CNS), \$30,000  
August 1, 2001 - July 31, 2002  
“ISI 2007”  
NSF (EIA), \$10,000  
August 15, 2001 - June 30, 2008  
“Travel Support for US Participation in Joint EU/NSF Strategic Workshops”  
NSF (EIA), \$344,052  
August 15, 2001 - July 31, 2008  
“World Science Forum”  
NSF (EIA), \$15,000  
August 15, 2001 - December 31, 2008  
“Three Special Focus Programs at DIMACS”  
NSF (IIS), \$730,134  
August 15, 2001 - December 31, 2008  
“Working Groups in Data Analysis and Mining”  
NSF (IIS), \$80,000  
September 15, 2001 - August 31, 2004  
“Planning Workshop: Quantum Communications, Cryptography and Coding”  
NSF (CCF), \$24,795  
January 15, 2002 - December 31, 2002  
“Working Group on Analogies Between Computer Viruses and Immune Systems and Biological Viruses and Immune Systems”  
ONR, \$25,377  
January 15, 2002 - January 14, 2003  
“International Conference on Computational and Mathematical Epidemiology”  
Alfred P. Sloan Foundation, \$45,000  
February 1, 2002 - September 30, 2002  
“Special Projects: Mathematical Sciences Methods for the Study of Deliberate Releases of Biological Agents and their Consequences”  
NSF (IIS), \$39,988  
March 1, 2002 - February 29, 2004  
“DIMACS-DIMATIA International REU Program”  
NSF (EIA), \$654,305  
May 15, 2002 - April 30, 2008  
“DIMACS Workshop: Data Depth: Robust Multivariate Analysis, Computational Geometry and Applications”  
NSF (DMS), \$18,000  
July 1, 2002 - September 30, 2003  
“Computational Information Theory and Coding”  
NSF (CCF), \$190,197  
July 1, 2002 - June 30, 2005  
“U.S.-Czech-Hungarian Collaboration on Discrete Mathematics and Theoretical Computer

- Science Involving DIMACS-DIMATIA-Renyi Center”  
NSF (OISE), \$155,949  
July 1, 2002 - June 30, 2007
- “Monitoring Message Streams”  
NSF (CCR), \$2,047,523  
July 1, 2002 - August 31, 2008
- “Author Identification”  
NSF (CCR), \$239,500  
July 1, 2002 - August 31, 2008
- “Mining Multilingual Resources Using Text Analysis”  
NSF (CCR), \$749,959  
July 1, 2002 - August 31, 2008
- “Workshop in Video Mining and Data Depth”  
NSA, \$20,000  
July 3, 2002-July 2, 2003
- “Special Project: Satellite Reconnect Project”  
NSF (CNS), \$636,376  
July 15, 2002 - June 30, 2007
- “Summer Tutorial on Epidemiology for Mathematical Sciences and the Workshop on Host-Pathogen Dynamics”  
Burroughs Wellcome Fund, \$35,000  
August 1, 2002 - September 30, 2002
- “ITR: Special Focus on Computer Science and Epidemiology”  
NSF (IIS), \$3,065,000  
September 1, 2002 - August 31, 2010
- “DIMACS Workshop on Software Security”  
NSF (CNS), \$15,737  
February 1, 2003 - January 31, 2005
- “SGER: DIMACS Exploratory Postdoctoral Program in Computational Epidemiology”  
NSF (IIS), \$100,000  
April 15, 2003 - March 31, 2005
- “Workshop on Information Processing in the Biological Organism”  
NSF (IIS), \$56,609  
May 1, 2003 - April 30, 2006
- “Three Workshops in Data Analysis and Mining”  
NSF (CCF), \$45,000  
July 1, 2003 - June 30, 2005
- “DIMACS Workshop on Computational Geometry and Computer-Aided Design and Manufacturing”  
NSF (CCF), \$19,200  
August 1, 2003 - July 31, 2004
- “DIMACS Special Focus on Communication Security and Information Privacy”  
NSF (CCR), \$350,000  
August 15, 2003 - July 31, 2009
- “US-France Cooperative Research: Computer Science and Decision Theory Applications of Notions of Consensus”

- NSF (OISE), \$39,000  
February 1, 2004 - January 31, 2007  
“DIMACS Special Focus on Computation and the Socio-Economic Sciences”  
NSF (SES), \$225,000  
April 1, 2004 - March 31, 2008  
“SGER: Connections between Mathematics and Biology in the High Schools: An Experimental Program”  
NSF (DRL), \$175,430  
August 1, 2004 - July 31, 2007  
“Workshop on Computational Tumor Modeling”  
NSF (CCF), \$23,900  
September 1, 2004 - August 31, 2008  
“Special Focus on Information Processing in Biology”  
NSF (CCF), \$339,920  
September 1, 2004 - August 31, 2011  
“Linking Mathematics and Biology in the High Schools: A Conference to be Convened at the DIMACS Center at Rutgers University, Piscataway, NJ, October 1-2, 2004”  
NSF (DRL), \$20,000  
September 15, 2004 - August 31, 2005  
“Partnering Teachers in the Biological and Mathematical Sciences”  
NSF (CCR), \$86,976  
March 15, 2005 - August 31, 2008  
“Insightful Understanding of China's Higher Education and Research in Computer Science and Information Technology”  
NSF (CNS), \$125,000  
June 1, 2005 - May 31, 2010  
“ $D^3$ : New Directions, Dimensions, and Domains for Computer Science”  
NSF (CNS), \$936,271  
June 1, 2005 - September 30, 2011  
“Workshops Connecting Theoretical CS to Other Fields”  
NSF (CCF), \$314,950  
June 15, 2005 - May 31, 2010  
“A Decision Logic Approach to the Port-of-Entry Inspection Problem”  
NSF (SES), \$617,999  
July 1, 2005 - August 31, 2010  
“UMDNJ (EPA) Environmental Bioinformatics Research Center”  
UMDNJ, \$50,004  
October 1, 2005 - September 30, 2011  
“Facing the Challenge of Infectious Diseases in Africa: The Role of Mathematical Modeling in Designing Cost-effective Control Strategies and Policies”  
Burroughs Wellcome Fund, \$10,000  
March 1, 2006-December 31, 2006  
“US-Africa Workshop: The Role of Mathematical Modeling in Facing the Challenge of Infectious Disease in Africa; Johannesburg, South Africa; September 26-28, 2006”  
NSF (OISE), \$81,746  
August 1, 2006 - July 31, 2007

- “DIMACS/Georgia Tech Special Focus on Discrete Random Systems”  
NSF (DMS), \$191,500  
August 1, 2006 - July 31, 2010
- “DNA Barcode Data Analysis Initiative: Tools for a New Generation of Biodiversity Data”  
NSF (DBI), \$27,842  
September 1, 2006 - August 31, 2008
- “Mathematical Modeling of Infectious Diseases in Africa: A Shortcourse”  
NSF (ISE), \$122,048  
September 1, 2006 - August 31, 2009
- “University-Industry Postdoctoral Fellow in Telecom/Combinatorics and Optimization”  
NSF (DMS), \$71,000  
September 1, 2006 - August 31, 2009
- “The Bio-Math Connection”  
NSF (ESI), \$2,724,813  
October 15, 2006 - September 30, 2012
- “The Center for Dynamic Data Analysis for Homeland Security”  
ONR, \$3,000,000  
October 16, 2006 - October 15, 2009
- “Optimization Problems of Detection Systems”  
ONR, \$224,863  
November 20, 2006 - January 31, 2010
- “REU Site: DIMACS/DIMATIA U.S./Czech International REU Program”  
NSF (CFF), \$390,000  
February 15, 2007 - January 31, 2011
- “Workshop on Recent Advances in Mathematics and Information Sciences for Analysis and Understanding of Massive and Diverse Sources of Data”  
ONR, \$20,046  
April 2, 2007 - April 2, 2008
- “ARI-MA: Sensor Management Problems of Nuclear Detection”  
NSF (CBET), \$485,767  
September 1, 2007 - August 31, 2008
- “Second US-China Computer Science Leadership Summit”  
NSF (CNS), \$99,971  
September 1, 2007 - August 31, 2010
- “DyDAn Fellowship Program in Homeland Security at Rutgers University”  
DHS, \$499,950  
September 1, 2007 - September 29, 2010
- “DIMACS Special Focus on Algorithmic Foundations of the Internet”  
NSF (CNS), \$311,867  
October 1, 2007 - September 30, 2013
- “DIMACS Workshop on Streaming, Coding, and Comprehensive Sensing: Unifying Theory and Common Applications to Sparse Signal/Data Analysis and Processing”  
ONR, \$16,821  
May 15, 2008 - May 14, 2009
- “Sensor Management for Nuclear Detection”  
DHS, \$1,510,643

- September 1, 2008 - August 30, 2012  
“DyDAn Fellowship Program in Homeland Security at Rutgers University”  
DHS, \$400,000
- September 1, 2008 - June 30, 2013  
“African Biomathematics Initiative”  
NSF (DMS), \$940,000
- September 15, 2008 - August 31, 2012  
“DIMACS Workshop on Hardness of Approximation”  
NSA, \$10,000
- October 1, 2008- September 30, 2009  
“Center of Excellence for Command, Control, and Interoperability (CCICADA)”  
DHS, \$6,775,620
- July 1, 2009 - June 30, 2013  
“AF: Small: Computer Science and Decision Making”  
NSF (CCF), \$300,000
- September 1, 2009 - August 31, 2013  
“REU Site: DIMACS/DIMATIA U.S./Czech International REU Program”  
NSF (CCF), \$532,637
- March 1, 2010 - February 28, 2013  
“WTC Commerce and Security Project WTC-CASS”  
DHS, \$561,434
- July 1, 2010 - June 30, 2011  
“IRIS to ISI”  
DHS, \$150,000
- September 1, 2010 - May 31, 2011  
“CCICADA Fellowship Program in Homeland Security at Rutgers University”  
DHS, \$400,000
- September 1, 2010 - August 31, 2013  
“Miscellaneous Projects at CCICADA”  
DHS, \$250,000
- September 15, 2010 – Sept. 14, 2011  
“Workshop on Mathematical Challenges for Sustainability”  
NSF (DMS), \$111,249
- September 15, 2010 - August 31, 2013  
“The Challenge of Interdisciplinary Education: Math-Bio”  
NSF (DRL), \$1,634,808
- September 15, 2010 - August 31, 2014  
“CMISS: DIMACS Project on CS/Math in Service to Society”  
NSF (CCF), \$800,000
- September 15, 2010 - August 31, 2014  
“Genome Structure and Variation Workshop to be held in the summer 2011 at Rutgers  
Center for Discrete Mathematics and Theoretical Computer Science (DIMACS)”  
NSF (MCB), \$36,190
- October 1, 2010 - September 30, 2011  
“Workshops: Special Focus on Algorithmic Decision Theory”  
NSF (SES), \$70,000



- October 1, 2010 - September 30, 2013  
“Stadium Evacuation”  
DHS, \$404,000  
December 9, 2010 - June 30, 2012  
“Stadium Evacuation”  
DHS, \$120,729  
Jan. 1, 2011 – Aug. 20, 2011  
“Social Media Alerts and Warnings”  
DHS, \$425,000  
January 7, 2011 - June 30, 2012  
“Smart Phone Apps that Connect to the Incident Command Function of the Hippocrates Online System”  
State of New Jersey, Department of Health and Senior Services, \$249,540  
March 1, 2011 - July 31, 2011  
“Conference on Effects of Genome Structure”  
Burroughs Welcome Fund, \$8,000  
July 1, 2011 - December 31, 2011  
“Conference on Effects of Genome Structure”  
International Union of Biological Sciences, \$7,100  
July 1, 2011 - December 31, 2011  
“Fusion Center for Data Analysis”  
DHS, \$82,781  
July 27, 2011 - July 26, 2012  
“IRIS”  
DHS, \$129,200  
September 1, 2011 – August 31, 2012  
“Three New DIMACS Special Focus Programs”  
NSF (CCF), \$698,995  
September 1, 2011 - August 31, 2015  
“A Targeted Risk-based Approach to Fisheries Law Enforcement in the First CG District”  
US Coast Guard, \$78,840  
September 16, 2011 – February 28, 2013  
“Algorithmic Decision Theory Workshop: The Science of Expert Opinion, October 2011”  
DOD/ARO, \$10,000  
October 1, 2011 - March 31, 2012  
“Urban Commerce and Security Study UCASS”  
DHS, \$77,000  
February 1, 2012 – June 30, 2012  
“ARMOR Wall System”  
DHS, \$400,000  
August 1, 2012 - June 30, 2013  
“ARMOR Wall System”  
DHS, \$14,000  
August 16, 2012 - June 30, 2013  
“Safety Act: Best Practices for Stadium Security”  
DHS, \$500,000

August 16, 2012 - June 30, 2013

“Cybersecurity”

DHS, \$50,000

September 13, 2012 - June 30, 2013

“CCICADA Fellowship Program in Homeland Security at Rutgers University”

DHS, \$500,000

September 1, 2012 - August 31, 2015

“Mathematics of Planet Earth beyond 2013 (MPE 2013+)”

NSF (DMS), \$467,549

September 1, 2012 - August 31, 2016

“Mathematical and Computational Methods for Planning a Sustainable Future”

NSF (DRL), \$425,773

October 1, 2012 - September 30, 2014

**Talks:****Noteworthy Talks:**

SIAM National Meeting invited address, Cal. Tech., 1974  
 Sigma Xi lecture, Swarthmore, 1976  
 CBMS-NSF Research Conference lecturer, Colby College, 1977  
 Mathematical Association of America National Meeting, invited address, Biloxi, 1979  
 International Congress on Mathematics Education, Berkeley, 1980  
 Outstanding Mathematician Lectures, University of New Haven, 1983  
 International Symposium on Operations Research, Osnabruck, W. Germany, 1984  
 Beijing Mathematical Society, 1985  
 Southeastern Conference on Combinatorics, Graph Theory, and Computing, Boca Raton, FL, 1987  
 First International Symposium on Combinatorics, Seoul, S. Korea, 1995 (series of two plenary lectures)  
 Royal Nepal Academy of Science and Technology, Kathmandu, Nepal, 1998  
 Distinguished Computer Science Lecture Program, New York Academy of Sciences, 2001  
 Rota Lecture at Conference on Interconnections among Codes, Designs, Graphs and Molecular Biology, Hsinchu, Taiwan, 2002  
 American Mathematical Society Congressional Briefing: "Homeland Security: What Can Mathematicians Do?" Washington, DC, 2004  
 EUROXXI (21st European Conference on Operations Research sponsored by the Association of European Operational Research Societies, EURO), Reykjavik, Iceland, July 2006  
 40th Southeastern Conference on Combinatorics, Graph Theory, and Computing, Boca Raton, Florida, March 2009  
 First International Conference on Algorithmic Decision Theory, Venice, October 2009  
 Mathematique de la planete Terre, lecture at University of Paris Dauphine on occasion of being awarded Docteur Honoris Causa, June 2013  
 Plenary Talk at National Football League Security Summit, Carlsbad, CA, June 2014  
 Willie B. Rajanna Memorial Lecture, Morgan State University, April 2015

**Special Lecture Series:**

Cornell University (10 lectures on Mathematical Models in Environmental Science), 1973  
 Colby College (10 lectures on Graph Theory and its Applications to Problems of Society), 1977  
 The Citadel (10 lectures on Discrete Mathematical Models in the Social, Biological and Environmental Sciences), 1978  
 Allegheny College (4 lectures on Graph-theoretical Models of Problems of Society), 1979  
 Western Maryland College (4 lectures on Applications of Graph Theory), 1981  
 Associated Colleges of Central Kansas (4 lectures on Applications of Discrete Mathematics), 1985  
 ORSA National Meeting, Boston (6 lectures on Applications of Graph Theory), 1985  
 Academia Sinica, Beijing (4 lectures), 1985  
 Jilin University of Technology, Changchun, China (8 lectures), 1985  
 Claremont Graduate School (6 lectures on Applications of Discrete Mathematics), 1986  
 Florida Atlantic University (4 lectures), 1987

Le Troisieme Cycle Romand in Operations Research, Grimentz, Switzerland (14 lectures), 1988  
 Jackson State University (3 lectures on Graph Theory and its Applications), 1990  
 William Paterson College (4 lectures on Graph Theory and its Applications), 1992  
 DIMACS Working Group Meeting on Order-theoretic Aspects of Epidemiology, (6 hours of lectures on The Theory of Measurement and its Applications), 2005  
 MAA Mathfest, Knoxville, TN (2 hours of lectures on Measurement of Pollution at Short Course in Environmental Modeling), 2006  
 INFORMS National Meeting, Austin, TX (tutorial series on Meaningless Statements in Epidemiology), 2010  
 Two Lectures on Data Analysis and Homeland Security at Visual Analytics Summer School, Middlesex University, London, UK, 2010

**Invited Addresses:**

Bay Area Colloquium in the Philosophy and Methodology of Science, Berkeley, 1967  
 NSF Workshop on Perceptual Geometries, Miami, 1970  
 Mathematics Association of Two-Year Colleges of NJ, Fall Meeting, Camden County College, 1972  
 SIMS (SIAM Institute for Mathematics and Society) Mtg., Sterling Forest, NY, 1973  
 Organization for Economic Cooperation & Development Seminar on Structural Analysis, Paris, 1973  
 SIAM National Meeting, Cal Tech, 1974  
 New York Academy of Sciences, 1974  
 National Association of Independent Schools Convention, Atlantic City, New Jersey, 1975  
 Association of Mathematics Teachers of NJ, Caldwell College, 1975  
 SIMS Research Applications Conference on Energy, Alta, Utah, 1975  
 National Council of Teachers of Mathematics, New York, 1975  
 Indiana University Workshop on Applied Mathematics, 1975  
 Mathematical Association of America, Philadelphia Section, Gettysburg College, 1976  
 International Conference on Graph Theory and its Applications, Western Michigan University, 1976  
 Mathematical Association of America, Ohio Section, Marshall University, 1976  
 New York Academy of Sciences, 1977  
 NY Academy of Sciences, International Conference on Combinatorial Mathematics, 1978  
 Mathematical Association of America, National Meeting, Biloxi, MS, 1979  
 Mathematical Association of America, Texas Section, Texas Tech University, 1979  
 Mathematical Association of America, Allegheny Mountain Section, Westminster College, 1979  
 SIAM, Southeastern Atlantic Section, University of Alabama, Birmingham, 1980  
 International Conference on Graph Theory and its Applications, Western Michigan University, 1980  
 International Congress on Mathematics Education, Berkeley, 1980  
 Mathematics Association of Two-Year Colleges of NJ, Fall Meeting, Trenton State College, 1980  
 Workshop on Fundamental Logical Concepts of Measurement, Turin, Italy, 1983  
 International Conference on Mathematical Psychology, Brussels, 1983

- International Conference on Graph Theory and its Applications, Western Michigan University, 1984
- NATO Conference on Graphs and Orders, Banff, 1984
- International Symposium on Operations Research, Osnabruck, West Germany, 1984
- Mathematical Association of America, Northeastern Section, Springfield, MA, 1984
- NY Academy of Sciences, International Conference on Combinatorial Mathematics, 1985
- Beijing Mathematical Society, 1985
- Mathematical Association of America, NJ Section, Hoboken, 1986
- Advanced Research Institute in Discrete Applied Mathematics, New Brunswick, New Jersey, 1986
- Eric F. Gardner Conference (NY/Ontario Measurement and Statistics Conference), Rochester, NY, 1986
- Southeastern Conference on Combinatorics, Graph Theory, and Computing, Boca Raton, FL, 1987
- Mathematical Association of America, Florida Section, Boca Raton, FL, 1987
- Mathematical Association of America, Allegheny Mountain Section, Erie, PA, 1987
- First International Colloquium on Pseudo-Boolean Optimization and Related Areas, Chexbres, Switzerland, 1987
- Workshop on Applications of Combinatorics and Graph Theory in the Biological and Social Sciences, Institute for Mathematics and its Applications, University of Minnesota 1988 (2 lectures)
- International Conference on Graph Theory and its Applications, Western Michigan University, 1988
- Graph Theory Day, New York Academy of Sciences, New York, 1988
- Workshop on Measurement Theory, Center for Advanced Study in the Behavioral Sciences, Palo Alto, California, 1988 (2 lectures)
- Conference on Applications of Graph Theory to Computer Science and Other Fields, New Mexico State University, Las Cruces, 1989
- Hartford Conference on the First Two Years: Teaching the Mathematical Core, University of Hartford, 1989
- Sixth Annual Rose-Hulman Conference on Undergraduate Mathematics, Rose-Hulman Institute of Technology, Terre Haute, Indiana, 1989, (2 lectures)
- AFOSR Day, Air Force Office of Scientific Research, DC, 1989
- Spring Meeting, Mathematical Association of America, New Jersey Section, and American Mathematical Association of Two Year Colleges of New Jersey, Princeton University, 1990
- First Alaska Graph Theory Conference: Quo Vadis Graph Theory, Fairbanks, Alaska, 1990
- Workshop on Graph Labellings, Northeastern University, Boston, 1991
- DIMACS/RUTCOR Workshop on Combinatorial Optimization in Science and Technology, New Brunswick, NJ, 1991
- Mathematical Association of America, Eastern Pennsylvania/Delaware Section, LaSalle College, Philadelphia, 1991
- SIAM, Southeast Atlantic Section Spring Meeting, Western Carolina University, Cullowhee, NC, 1991
- Sixth Clemson Miniconference on Discrete Mathematics, Clemson University, Clemson, SC, 1991

International Conference on Graph Theory and its Applications, Western Michigan University, 1992  
European Mathematical Psychology Group, Brussels, Belgium, 1992  
Mathematical Association of America, Seaway Section, Ithaca, New York, 1992  
Conference on Graphs and Matrices, Boulder, Colorado, 1993  
International Conference on Ordinal Data Analysis, University of Massachusetts, Amherst, 1993  
New York Academy of Sciences Graph Theory Day, Bard College, Annandale-on-Hudson, New York, 1993  
First International Symposium on Combinatorics, Seoul, S. Korea, 1995 (series of two plenary lectures)  
Mathematical Association of America, NJ Section, Cranford, NJ, 1996  
International Conference on Graph Theory, Combinatorics, Algorithms, and Applications, Kalamazoo, MI, 1996  
European Special Interest Group in Multicriteria Analysis (ESIGMA), annual meeting, Brussels, Belgium, 1996  
International Conference on Ordinal and Symbolic Data Sets, Darmstadt, Germany, 1997  
International Conference on the Future of Discrete Mathematics, Stirin Castle, Czech Republic, 1997  
International Workshop on Graph Colouring and Applications, Montreal, May 1997  
Cumberland Conference on Combinatorics, Graph Theory, and Computing, Johnson City, Tennessee, 1998  
Royal Nepal Academy of Science and Technology, Kathmandu, Nepal, 1998  
International Conference on Ordinal and Symbolic Data Analysis, Amherst, MA, 1998  
DIMACS Miniworkshop on Mathematical and Computational Approaches to Elections, 1999  
DIMACS Research and Education Institute, 1999  
International Conference on Combinatorial and Computational Mathematics, Pohang, Korea, 2000  
International Conference on Graph Theory, Combinatorics, Algorithms, and Applications, Kalamazoo, MI, 2000  
DIMACS Connect Institute, 2000  
International Conference 2000 -- The Year of Mathematics (on the occasion of the 50th anniversary of the Mathematical Institute of the Hungarian Academy of Sciences and the 150th Anniversary of the Academy), Budapest, 2000  
DIMACS Workshop on Bioconsensus, 2000  
Clemson Miniconference on Discrete Mathematics, Clemson, SC, 2000  
DIMACS Connect Institute, 2001  
DIMACS Workshop on Bioconsensus II, 2001  
Conference on Interconnections among Codes, Designs, Graphs, and Molecular Biology, Hsinchu, Taiwan, 2002  
DIMACS Workshop on Labelings and Numberings of Graphs, 2002  
DIMACS Connect Institute, 2002  
West Point Conference on Discrete Mathematics, 2002  
DIMACS Connect Institute, 2003  
International Conference on Ordinal and Symbolic Data Analysis, Irvine, California, 2003  
DIMACS-DIMATIA-Renyi Working Group Meeting on Graph Colorings and their

Generalizations, 2003.  
Conference on Good Ideas in Teaching Precalculus and ..., Rutgers University, 2004  
Mathematical Association of America, NJ Chapter, 2004  
DIMACS-DIMATIA-Renyi Working Group Meeting on Algebraic and Geometric Methods  
in Combinatorics, Budapest, 2004  
Society for Mathematical Psychology Annual Meeting (Falmagne Festschrift), Ann Arbor,  
MI, 2004  
Workshop on Computer Science and Decision Theory, Paris, 2004  
DIMACS Bio-Math Connect Institute, 2004  
Workshop on Graph Colorings and their Generalizations, Renyi Institute, Budapest,  
Hungary, 2005  
DIMACS Bio-Math Connect Institute, 2005  
Conference on Mathematical Methods in Counter-terrorism, Columbia, SC, 2005  
Conference on Probabilistic Combinatorics and Algorithms: A Conference in Honor of Joel  
Spencer's 60th Birthday, 2006  
DIMACS/DIMATIA/Renyi Combinatorial Challenges Conference, 2006  
Combinatorial Challenges 2006 (A Meeting in Celebration of Pavol Hell's 60th Birthday),  
Victoria, BC, Canada, 2006  
EUROXXI (21st European Conference on Operations Research sponsored by the Association  
of European Operational Research Societies, EURO), Reykjavik, Iceland, July 2006  
DIMACS Bio-Math Connect Institute, Broomfield, CO, July 2006  
Workshop on on Facing the Challenge of Infectious Diseases in Africa: The Role of  
Mathematical Modeling, Johannesburg, South Africa, September 2006  
Workshop on Voting Theory and Preference Modeling, University of Paris - Dauphine,  
October 2006  
Plenary talk at Mathematical Association of America, Allegheny Mountain Section, April  
2007  
Workshop on Mathematical Modeling of Infectious Diseases in Africa, Stellenbosch, South  
Africa, June 2007  
DIMACS BioMath Connection Field Testers Workshop, July 2007  
Plenary talk at European Mathematical Psychology Group meeting, Luxembourg, September  
2007  
Minisymposium on Discrete Sciences Applications in Homeland Security, Rutgers  
University, September 2007  
Math Awareness Month Workshop on Mathematics and Voting Theory, New Jersey City  
University, April 2008  
Charles Franke Memorial Lecture, Seton Hall University, April 2008  
Conference in Honor of F.R. "Buck" McMorris, Illinois Institute of Technology, May 2008  
Plenary talk at European Commission Measuring the Impossible Network Training Course,  
Gena, Italy, June 2008  
DIMACS BioMath Connection Field Testers Workshop, July 2008  
Plenary talk at 40<sup>th</sup> Southeastern Conference on Combinatorics, Graph Theory, and  
Computing, Boca Raton, FL, March 2009  
Plenary talk at Conference on Mathematics and Biology: The New Educational Synergy  
SUNY Farmingdale, April 2009  
DIMACS BioMath Connect Institute, July 2009

Advanced Study Institute in Economic Epidemiology, Makerere University, Kampala, Uganda, July 2009

National Association of Mathematicians, Mathfest, Washington, DC, November 2009

Plenary talk at meeting of NYC Section of the Mathematical Association of America, May 2010.

Math for America, New York University, January 2010

Workshop on Conservation Biology, Southern African Wildlife College, Hoedspruit, Limpopo, South Africa, August 2010

Workshop on Evidence-based Policy Making, University of Paris-Dauphine, December 2010

Workshop on Algorithmic Decision Theory for the Smart Grid, Rutgers, October 2010

DIMACS/CCICADA/DHS Student Conference on Discrete Mathematics: One Way to Exciting Careers in Homeland Security, Rutgers, July 2011

Workshop "Toward the Smart Grid," Lehigh University, Bethlehem, PA, January 2012

Workshop on Quantitative Ecology and Sustainable Environments, University of Kwazulu Natal, Durban, South Africa, July 2012

Workshop on Algorithmic Aspects of Information Fusion, Rutgers, November 2012

International Workshop on Clusters, Orders, Trees: Methods and Applications, in Honor of Professor Boris Mirkin, Moscow, Russia, December 2012

Plenary talk at Conference on Tools for Group Decision (OPDE)/Optimization Days, Montreal, May 2013

Invited talk at Workshop on Workshop on Conception Innovante des Politiques Publiques, University of Paris-Dauphine, June 2013

Invited talk at Workshop on Algorithmic Information Fusion and Data Mining (WAIFDM), DIMACS, September 2013

Invited talk at Workshop on Urban Planning for Climate Events, DIMACS, September 2013

Invited talk at Conference on Meaningfulness and Learning Spaces: A Tribute to the Work of Jean-Claude Falmagne, UC Irvine, February 2014

Plenary talk at New York Area Graph Theory Day, Rutgers University, April 2014

Invited talk at MPE2013+ Workshop on Sustainable Human Environments, DIMACS, April 2014

Invited talk at Workshop on Mathematics of Planet Earth: Data-Aware Energy Use, University of California, San Diego, September 2014

Invited talk at Atlanta Lecture Series in Combinatorics and Graph Theory XIII, November 2014

Plenary talk at International Conference on Cyber Security, Fordham University, January 2015

Invited talk at Conference on Validation: What is it?, University of California - Irvine, February 2015

Invited talk at Workshop on MPE: Natural Disasters, Georgia Tech, May 2015

Invited talk at Big 10 Security Directors Meeting, Piscataway, NJ, August 2015

Invited talk at Workshop on Mathematics of Planet Earth: Management of Natural Resources, Howard University, June 2015

Invited talk at Mathematics of Planet Earth: Education for the Planet Earth of Tomorrow, University of Tennessee, September 2015

Invited talk on Data and Citizens Science, International workshop on Citizen Science, University of Paris, Dauphine, December 2015



**Invited Lecture Series:**

- Five lectures on “Mathematics and the Social Sciences,” Mathematics Association of Two-Year Colleges of NJ, Middlesex County College, 1973
- Ten lectures on “Mathematical Models in Environmental Science,” Cornell University, 1973
- Ten Lectures on “Graph Theory and its Applications to Problems of Society,” an NSF-CBMS Research Conference, Colby College, 1977
- Ten lectures on “Discrete Mathematical Models in the Social, Biological and Environmental Sciences,” The Citadel, 1978
- Ten lectures on “Mathematical Models and Contemporary Problems,” MD-DC-VA Section of the MAA, Salisbury State College, 1978
- Four lectures on “Graph-theoretical Models of Problems of Society,” Allegheny College, 1979
- Four lectures on “Applications of Graph Theory,” Western Maryland College, 1981
- Five lectures on “Graph Theory Models in the Social Sciences and Group Decisionmaking,” Sloan Applied Mathematics Workshop, Davidson College, No. Carolina, 1983
- Outstanding Mathematician Lectures, University of New Haven, 1983
- Four-lecture minicourse on “Applications of Discrete Mathematics,” MAA Annual Meeting, Louisville, 1984
- Four-lecture minicourse on “Applications of Discrete Mathematics,” MAA Annual Meeting, Anaheim, 1985
- Four lectures on “Applications of Discrete Mathematics,” Association Colleges of Central Kansas, McPherson, KS, 1985
- Day-long Workshop on “Applications of Graph Theory,” ORSA Annual Meeting, Boston, 1985
- Eight lectures at Jilin University of Technology, Changchun, Jilin Province, Peoples Republic of China, 1985
- Four lectures at Academia Sinica, Beijing, Peoples Republic of China, 1985
- Two lectures at University of Shandong, Jinan, Shandong Province, Peoples Republic of China, 1985
- Two lectures at Tongji University, Shanghai, Peoples Republic of China, 1985
- Six lectures on “Applications of Discrete Mathematics,” Claremont Graduate School, 1986
- Four lecture minicourse on “Applications of Discrete Mathematics,” MAA Annual Meeting, San Antonio, 1987
- Four lectures at Florida Atlantic University, Boca Raton, 1987
- Three lectures, MAA, Florida Section, Boca Raton, 1987
- Ten lectures on “Applications of Discrete Mathematics,” MAA Northeastern Section, University of Maine, Orono, 1987
- Fourteen lectures to le Troisieme Cycle Romand, Grimentz, Switzerland, 1988
- Twelve lectures for Mathematics Association of Two Year Colleges of New Jersey, Princeton, May 1988 and September 1988
- Four lectures to COMAP Faculty Advancement Workshop on Discrete Mathematics, Boston, MA, 1988
- Eight lectures, MAA Allegheny Mountain Section, Allegheny College, Meadville, PA, 1988
- Four lecture minicourse on “Applications of Discrete Mathematics,” MAA Annual Meeting, Phoenix, 1989
- Five lectures on Applications of Graph Theory, DIMACS Summer Workshop for High

- School Teachers, New Brunswick, NJ, 1989
- Two lectures as Visiting Distinguished Professor, Clemson University, 1990
- Five Lectures on Applications of Graph Theory, DIMACS Summer Workshop for High School Teachers, New Brunswick, NJ, 1990
- Four Lectures on Applications of Graph Theory and Counting, DIMACS Summer Workshop for High School Students, New Brunswick, NJ, 1990
- Three lectures on Graph Theory and its Applications, Jackson State University, Jackson, Mississippi, 1990
- Two lectures on Applications of Graph Theory, DIMACS Summer Workshop for High School Teachers, New Brunswick, NJ, 1991
- Four lectures on Graph Theory and its Applications, William Paterson College, Wayne, NJ, 1992
- Five lectures on Applications of Graph Theory, DIMACS Summer Workshop for High School Teachers, New Brunswick, NJ, 1992
- Two Lectures on Order Relations and Utility Functions at Random Utility 2000, Duke University, 2000
- Two lectures on Applications of Graph Theory at Short Course on A Sampling of Applications of Graph Theory, MAA National Meeting, San Diego, CA, 2002
- Two lectures on Bioconsensus and Channel Assignments at University of Paris, Dauphine, 2002
- Six hours of tutorial lectures on The Theory of Measurement and its Applications at DIMACS Working Group Meeting on Order-theoretic Aspects of Epidemiology, DIMACS, 2005
- Two hours of lectures on Measurement of Pollution, MAA Mathfest, Short course on Environmental Modeling, Knoxville, TN, 2006
- Three lectures on Mathematics and Homeland Security at Conference on Mathematics and Homeland Security at Department of Homeland Security Center of Excellence for Dynamic Data Analysis, May 2007
- INFORMS National Meeting, Austin, TX (tutorial series on Meaningless Statements in Epidemiology), November 2010
- Two Lectures on Data Analysis and Homeland Security at Visual Analytics Summer School, Middlesex University, London, UK, September 2010

#### **Other Invited Lectures:**

- Panelist, MAA Summer Meeting, Dartmouth College, 1972
- Invited talk at George Washington University Conference on Graphs and Combinatorics, Washington, DC, 1973
- Symposium participant, Mathematical Psychology Meetings, Montreal, 1973
- Panelist, MAA Annual Meeting, San Francisco, 1974
- Invited talk at Operations Research Society of America Meeting, Chicago, 1975
- Panelist, MAA Annual Meeting, San Antonio, 1976
- Invited talk at Operations Research Society of America Meeting, New York, 1978
- Discussant, Energy Information Administration Symposium on Computer Assisted Analysis and Model Simplification, University of Colorado, 1980
- Invited talk at AMS Special Session on Graph Theory and Combinatorics, Bryn Mawr, 1982
- Invited panelist at MAA New Jersey Section Meeting, Georgian Court College, 1982

Invited talk at Silver Jubilee Combinatorics Conference, University of Waterloo, 1982  
Invited talk at Operations Research Society of America Meeting, Chicago, 1983  
Invited talk at Operations Research Society of America Meeting Orlando, FL, 1983  
Panelist at Meeting of Department Chairmen, AMS/MAA Annual Meeting, Louisville, 1984  
Invited talk at First Hoboken Symposium on Graph Theory, Stevens Inst. of Technology, 1984  
Invited panelist at Amer. Educational Research Asso./Nat'l Council on Measurement in Education Joint Annual Mtg., Chicago, 1985  
Panelist at NY Academy of Sciences Internat'l Conference on Combinatorial Mathematics, 1985  
Invited talk at special session at AMS National Meeting, New Orleans, 1986  
Invited minisymposium speaker, SIAM Nat'l Mtg., Denver, 1987  
Invited talk to West Windsor-Plainsboro High School, NJ, 1988  
Invited talk to Princeton High School, Princeton, NJ, 1988  
Invited talk to High School Institute for Science and Math, Douglass College, 1988  
Invited Faculty Workshop, Westfield High School, NJ, 1989  
Invited talk to Rahway High School, NJ, 1989  
Invited talk to High School Institute for Science and Math, Douglass College, 1989  
Invited talk to Spotswood High School, Spotswood, NJ, 1990  
Invited talk to International Symposium on Functional Equations, Graz, Austria, 1990  
Invited talk at Joint Policy Board in Mathematics Press Briefing on Mathematics and the Environment, Baltimore, MD, 1992  
Invited talk at ECCO V, meeting of European Chapter on Combinatorial Optimization, Technische Universitat of Graz, Graz, Austria, 1992  
Invited talk at Fourth Annual Stony Brook Biomathematics Conference, SUNY, Stony Brook, NY, 1992  
Invited talk at 4th Intern. Conference on Information Processing and Management of Uncertainty in Knowledge-Based Systems, Palma de Mallorca, Spain, 1992  
Series of four invited talks at workshop on Mathematical Systems Underlying Axiomatic Measurement Theories, University of California, Irvine, CA, 1992  
Invited talk at conference on Discrete Mathematics in the Schools, DIMACS, 1993  
Invited panelist at Conference on Graduate Programs in the Applied Mathematical Sciences, Clemson University, Clemson, SC, 1993  
Invited talk at special session on Graph Theory at American Mathematical Society Meeting, Washington, DC, 1993  
Invited talk at Cresskill High School, Cresskill, NJ, 1994  
Invited talk at special session on Graph Theory at American Mathematical Society Meeting, Orlando, FL, 1995  
Invited talk at Ocean Township High School, Oakhurst, NJ, 1995  
Invited talk at Livingston High School, Livingston, NJ, 1995  
Invited talk at DIMACS Leadership Program Reunion, Piscataway, NJ, 1995  
Invited talk at Rutherford High School, Rutherford, NJ, 1996  
Invited talk at International Conference on Combinatorics, Balatonlelle, Hungary, 1996  
Invited talk at session on Mathematics and the Social Sciences, American Mathematical Society Mathfest, Seattle, Washington, 1996  
Invited talk at DIMACS workshop on Mathematical Hierarchies and Biology, Piscataway,

- NJ, 1996
- Invited talk at special session on Partially Ordered Sets, American Mathematical Society Meeting, San Diego, CA, 1997
- Invited talk at special session on Mathematical Aspects of Consensus Theory, American Mathematical Society Meeting, Washington, DC, 2000
- Invited talk to Math Academy 2000, Archdiocese of Newark, Program for Teachers, Seton Hall University, 2000
- Invited panelist, Conference on Challenges for Theoretical Computer Science, Portland, OR, 2000
- Invited talk at Conference on Ordinal and Symbolic Data Analysis, Brussels, Belgium, 2000
- Invited panel organizer and panelist at Chairs Colloquium (for Chairs of Departments in the Mathematical Sciences), National Academy of Sciences, Washington, DC, 2000
- Invited talk at special session on Graph Theory, American Mathematical Society Meeting, Hoboken, NJ, 2001
- Invited talk at Collegiate School, New York, NY, 2001
- Invited talk at DIMACS Working Group Meeting on Mathematical Sciences Methods for the Study of Deliberate Releases of Biological Agents and their Consequences, 2002
- Invited talk at Symposium on Bioconsensus: Bringing Social Choice Theory to Biology, AAAS National Meeting, Boston, 2002
- Invited talk at Rutgers Symposium on Homeland Security, 2002
- Invited talk at DIMACS International Conference on Computational and Mathematical Epidemiology, 2002
- Invited talk at Minisymposium on Applications of Mathematics to the Study of Deliberate Releases of Biological Agents and Related Topics, SIAM 30th Anniversary Meeting, Philadelphia, 2002
- Invited talk at Conference on Mathematical Modeling of the Spread of Selected Bioterrorism Agents, MITRE Corporation, 2002
- Invited Talk at Knowledge, Discovery and Dissemination Symposium, 2003
- Invited talk at MITRE Corporation Meeting on Modeling and Prediction of Disease, McLean, VA, 2003
- Invited talk at DIMACS Workshop on Tree of Life, 2003
- Invited talk at Knowledge, Discovery and Dissemination Symposium, McLean, VA, 2003
- Invited talk at Rutgers University Symposium on Homeland Security Research, Sept. 2003
- Invited talk at State of New Jersey Symposium on Homeland Security Research, Oct. 2003
- Invited talk at NIH BISTI (Biomedical Information Science and Technology Initiative) Symposium: Digital Biology: The Emerging Paradigm, Bethesda, MD, 2003
- Invited talk at Minisymposium, ENST-Bretagne, Brest, France, 2004
- Invited panelist at ASA Workshop on Statistics and Counter-terrorism, New York, 2004
- Invited talk at Knowledge, Discovery and Dissemination Symposium, McLean, VA, 2004
- Invited talk at INFORMS Special Session on Diagnosis Models for Port of Entry Inspections, San Francisco, November 2005
- Invited talk at Knowledge, Discovery and Dissemination Symposium, McLean, VA, 2005
- US-China Computer Science Leadership Summit, Beijing, China, May 2006
- Invited talk at Knowledge, Discovery and Dissemination Symposium, McLean, VA, 2006
- Talk at Conference on Probabilistic Combinatorics & Algorithms: a Conference in Honor of Joel Spencer's 60th Birthday, April 2006

- Invited talk at DHS Workshop on Consequence Modeling, March 2007
- Invited panelist at DHS University Programs Summit, Washington, DC, March 2007
- Talk at Advanced Study Institute on Mathematical Modeling of Infectious Diseases of Africa, at African Institute for Mathematical Sciences, Muizenberg, South Africa, June 2007
- Talk at Workshop on Puzzling Mathematics and Mathematical Puzzles: a Gathering in Honor of Peter Winkler's 60th Birthday, Rutgers, June 2007
- Invited Talk at National Visual Analytics Consortium Meeting, Pacific Northwest National Labs, November 2007
- Talk at Domestic Nuclear Detection Academic Research Initiative Conference, April 2008
- Talk at DIMACS Workshop on New Directions in Algorithms, Combinatorics and Optimization: A Conference Honoring the 65th Birthday of William T. Trotter, Georgia Tech, May 2008
- REU Seminar, DIMACS, June 2008
- Invited talk on modeling the impact of policy options at Workshop on Modeling the Impact of Policy Options during Public Health Crisis, Banff International Research Station, July 2008
- Invited talk on climate and disease at Workshop on Modeling the Impact of Policy Options during Public Health Crisis, Banff International Research Station, July 2008
- Response Talk at Workshop on Algorithmic Decision Theory, University of Paris-Dauphine, October 2008
- Workshop on Port Security/Safety, Inspection, Risk Analysis and Modeling, Rutgers, November 2008
- Workshop on Mathematical Science Methods to Enhance Nuclear Detection, Rutgers, November 2008
- Invited talk at Workshop on Boolean and Pseudo-Boolean Functions in Memory of Peter L. Hammer, January 2009
- Talk at Domestic Nuclear Detection Academic Research Initiative Conference, April 2009
- REU Seminar, DIMACS, June 2009
- Invited talk at Visual Analytics Community (VAC) Consortium Meeting, University of Maryland, August 2009
- Invited talk at International Conference on Stochastic Modeling and Optimization Dedicated to the 80<sup>th</sup> Birthday of Andras Prekopa, November 2009
- Invited talk at Kickoff Conference for DHS Center for Visual Analytics for Command, Control, and Interoperability Environments (VACCINE), Purdue University, November 2009
- Talk at NJ Office of Homeland Security and Preparedness, Hamilton, NJ, January 2010
- Invited talk at Department of Homeland Security University Network Summit, Washington, DC, March 2010
- Talk at Domestic Nuclear Detection Academic Research Initiative Conference, April 2010
- Talk at New York City Police Department, April 2010
- REU Seminar, DIMACS, June 2010
- Invited talk at Advanced Study Institute on Conservation Biology, Southern African Wildlife College, Hoedspruit, Limpopo, South Africa, August 2010
- Invited talk at US Coast Guard Research and Development Center, New London, CT, September 2010

Talk at New York City Police Department, November 2010  
 Invited talk at DHS University Programs Summit, Washington, DC, March 2011  
 Talk at Domestic Nuclear Detection Academic Research Initiative Conference, April 2011  
 Invited talk at Visual Analytics Community (VAC) Consortium Meeting, University of Maryland, May 2011  
 Invited talk at Technologies for Incident Preparedness Conference, National Harbor, MD, September 2011  
 Invited talk at Workshop on Effective Engagement and Collaboration of US CISE-China Researchers, Arlington, VA, May 2011  
 Invited talk at Workshop on Information and Communication Technologies for Sustainability, held in Conjunction with IEEE SECON 2011, Sal Lake City, June 2011  
 Invited talk at Maritime Risk Symposium, Rutgers, November 2011  
 Invited Talk at 10 Years Later: A National Conference on Preparedness and Response, New Brunswick, NJ, December 2011  
 Talk at Domestic Nuclear Detection Academic Research Initiative Conference, July 2012  
 Invited Talk at Immigration and Customs Enforcement, Washington, DC, October 2012  
 Invited Talk at DHS Office of Strategic Planning, Analysis, and Risk, October 2012  
 Invited talk at Special Session Mathematics of Planet Earth: Energy, Population, Sustainability, at Joint Mathematics Meetings, San Diego, CA, January 2013  
 Invited panel talk at National Strategic Maritime Risk Conference, Purdue University, November 2013  
 Invited talk at American Mathematical Society Special Session on My Favorite Graph Theory Conjectures, Baltimore, MD, January 2014  
 Invited talk at MPE2013+ Workshop: Challenges and Opportunities, Arizona State University, January 2014  
 Invited panel talk at Conference on Cyber/Homeland Security - Opportunities for U.S.-Israel Partnerships, New Jersey Inst. of Technology, January 2014  
 Invited talk at Fusion Fest: Marrying Methods to Solve Real-world Problems, Rutgers University, October 2014  
 Invited panel talk at CREATE-TSA Summer Symposium, University of Southern California, July 2015  
 Invited talk at INFORMS National Meeting, Philadelphia, November 2015  
 Invited panel talk at Opportunities for U.S.-Israel Technology Partnerships for Advancing Innovation for First Responders & Homeland Security, NJIT, January 2016  
 Invited talk to Rutgers College Class of 1961, Rutgers Day, April 2016

**Misc. seminar talks at:**

Bell Labs\*, Columbia, Cornell\*, CUNY\*, Dartmouth\*, DIMACS\*, Duke, Educational Testing Service, Fordham, IBM, Ithaca College, Los Alamos National Laboratory, Miami University, Montclair State College, National Telecommunications and Information Administration, Northeastern\*, Orange Coast College, Princeton\*, RAND Corp.\*, Rutgers\*, Stanford\*, Stevens, Stony Brook\*, Telcordia Technologies, UC Berkeley, UC Irvine, UCLA\*, UC Riverside, Waterloo

(\* indicates more than once)

**Departmental or School-Wide Colloquia or Seminars:**

- 1967-68 Dartmouth
- 1968-69 Dartmouth
- 1969-70 Cornell, Dartmouth
- 1971-72 Binghamton, Cornell, Dartmouth, Denver
- 1972-73 Baylor, Cornell, MIT, Texas
- 1973-74 Cornell, Gettysburg, Hunter, Lawrence, Montclair State, North Carolina State, Rutgers (Math), Rutgers (Computer Science), Seton Hall
- 1974-75 Adelphi, Colby, Cornell, Franklin and Marshall, Johns Hopkins, Miami of Ohio, Tennessee, Vanderbilt, Villanova, Virginia Tech., Wesley, Westinghouse Research Labs, Wilkes
- 1975-76 Connecticut, Salisbury State, Swarthmore, Union, Vassar, Wisconsin (Stevens Point), Western Carolina
- 1976-77 Bowling Green, Colgate, General Motors Res. Labs., Manhattan, Montclair State
- 1977-78 Harvard, North Carolina State
- 1978-79 Lehigh, Rider
- 1979-80 Bell Labs, Cornell, Exxon
- 1980-81 Hunter, Miami of Ohio, Rutgers (Indus. Engr.)
- 1981-82 The Citadel, Clemson, Mitre Corporation, Northeastern, South Carolina
- 1982-83 Rutgers (Operations Research)
- 1983-84 Lausanne, Missouri, Stevens, Wesleyan
- 1984-85 Aachen, Bonn, Johns Hopkins, McPherson, University of CA/Irvine, Rutgers (Industrial Engineering), East China Normal University (Shanghai, China), Beijing Institute of Tech (China)
- 1985-86 Rutgers (Operations Research)
- 1986-87 Free University of Brussels, Hartford, Maine
- 1987-88 Colorado (Denver), Miami University, Worcester Poly
- 1988-89 Glassboro State, Johns Hopkins, Supercomputing Research Center, Wright State
- 1989-90 Dickinson, Fordham, Northeastern, University of Puerto Rico, Williams
- 1990-91 Dartmouth, Waterloo, Xavier (New Orleans)
- 1991-92 Seton Hall
- 1992-93 Pittsburgh, Tennessee
- 1993-94 University of Colorado (Denver), Dartmouth, GERAD (University of Montreal)
- 1994-95 Louisville
- 1995-96 Kyung-Hee University (Seoul, S. Korea), Pohang Inst. of Science and Technology (Pohang, S. Korea), Dartmouth
- 1996-97 College of Staten Island (CUNY)
- 1997-98 Fordham, Jawaharlal Nehru University (Delhi, India)
- 1999-00 DIMATIA (Charles University, Prague, Czech Rep.), Indiana University of Pennsylvania, Cheju National University (Cheju Island, Korea), Kyung-Hee University (Seoul, Korea), Seoul National University (Seoul, Korea)
- 2001-01 Illinois Institute of Technology, South Carolina
- 2001-02 Dartmouth, University of Greenwich (UK), University of Michigan, National Taiwan University
- 2002-03 Colgate, Montclair State
- 2003-04 RPI

2004-05 Lawrence Livermore National Laboratory  
2005-06 Trinity, Xi'An Xiaotong (China)  
2007-08 Department of Homeland Security, Seton Hall  
2008-09 Los Alamos National Lab  
2009-10 Pacific Northwest National Lab  
2013-14 West Chester University  
2014-15 University of Texas – San Antonio



**Professional Activities:****Advisory Boards:**

- 1992-00: External Advisory Board, Center for Theoretical Studies in the Physical Sciences, NSF Minority Excellence Center at Clark Atlanta University
- 2003-06: Chair, Advisory Committee, NSF Office of International Science and Engineering
- 2003...: Representative to NJ State Regional Homeland Security Technology Council
- 2004-07: Advisory Committee, NJ Department of Homeland Security Center for Biological, Radiological, Nuclear, and Environmental (CBRNE) Training
- 2006...: Member, State of New Jersey Health Emergency Preparedness Advisory Council
- 2007-10: Co-Chair, NJ Office of Homeland Security and Preparedness (OHSP) Preparedness College
- 2009-12: Member, NSF Mathematical and Physical Sciences Advisory Committee
- 2010-12: Member, NSF Advisory Committee for Environmental Research and Education
- 2011...: Member, Scientific Advisory Committee to International Institute for Applied Systems Analysis
- 2012...: Member, Board on Mathematical Sciences and Applications, National Academy of Sciences

**Member of:**

- American Mathematical Society (AMS)
- Consortium for Mathematics and its Applications (COMAP)
- Mathematical Association of America (MAA)
- Institute for Operations Research and Management Science (INFORMS)
- Society for Industrial and Applied Mathematics (SIAM)
- Society for Mathematical Psychology
- Classification Society of North America
- Association for Computing Machinery (ACM), Special Interest Group in Algorithms and Computational Theory (SIGACT)
- Association for Women in Mathematics
- Society for Mathematical Biology

**Editorships:**

- Editor, SIAM Review, 1972-1979
- Editor, special issue of SIAM Jour. on Applied Math., Sept., 1975
- Associate Editoriate SIAM Jour. on Applied Math., 1975-1983
- Editorial Board, Encyclopedia of Math and its Applications, 1975-1983
- Editorial Board, Discrete Applied Mathematics, 1978 ...
- Advisory Editor and Editorial Board, Jour. of Math. Social Sciences, 1979-1997
- Editorial Board, Mathematical and Computer Modelling, 1979 ...
- Editorial Board, SIAM Journal on Algebraic & Discrete Methods, 1980-1987
- Editorial Board, Marcel Dekker Series in Pure and Applied Mathematics, 1980-1986
- Editorial Board, Annals of Operations Research, 1983 ...

Editorial Board., Journal of Mathematical Psychology, 1986 ...  
 Editorial Board, SIAM Journal on Discrete Mathematics, 1987-1997  
 Editorial Board, Journal of Combinatorics, Information, and Systems Science, 1990 ...  
 Editorial Board, Journal of Computational Biology, 1993 ...  
 Advisory Editorial Board, CRC Handbook of Discrete and Combinatorial Mathematics, 1993-1999  
 Editorial Board, Discrete Mathematics, Algorithms and Applications, 2009 ...  
 Advisory Board, Computational Social Networks, 2013 ...

**Positions in Professional Societies:**

1977-81: Secretary of SIAM  
 1980...: Member, COMAP (formerly UMAP) Consortium Council  
 1981: Candidate for President of SIAM  
 1981-82: Member, CBMS Council  
 1982: Candidate for SIAM Board of Trustees  
 1983-92: Member, Board of Directors of SIMS (formerly SIAM Institute for Mathematics and Society; now Societal Institute for the Mathematical Sciences)  
 1984-87: Vice President of SIAM  
 1987: Candidate for SIAM Board of Trustees  
 1987-92: Secretary of SIAM Institute for Mathematics and Society (SIMS)

**Other Activities for Professional Societies:**

1976-81: Member, Committee on the Undergraduate Program, MAA  
 1976-80: Member, CUPM Panel on a General Mathematical Sciences Program  
 1979-81: Chairman, MAA-SIAM Committee on Applications of Mathematics in the College Curriculum  
 1979-80: Member, SIAM Education Committee  
 1982-84: Member, SIAM Program Committee  
 1982-85: Chairman, SIAM Committee on Relations with the Federal Government  
 1984-87: Chairman, SIAM Major Awards Committee  
 1984-86: Member, Steering Committee, SIAM Activity Group in Discrete Mathematics  
 1986-90: Member, SIAM Committee on Science Policy  
 1988: Member, SIAM Nominating Committee  
 1990-92: Member, AMS Committee on Cooperative Symposia  
 1993: AMS Representative to Organizing Committee for International Conference on Ordinal Data Analysis  
 1997...: Member, AMS/AAAS Liaison Committee  
 2000...: Member, SIAM Committee on Science Policy  
 2006-08: Member, AMS Science Policy Committee  
 2002...: ACM/SIGACT Distinguished Service Award Prize Committee

**“Special Focus Programs” Organized:**

1993-00: DIMACS “Special Year” on Mathematical Support for Molecular Biology, Chair of Organizing Committee

- 1999-03: DIMACS Special Focus on Computational Molecular Biology, member of Organizing Committee
- 2002-10: DIMACS Special Focus on Computational and Mathematical Epidemiology, Chair of Organizing Committee
- 2004-08: DIMACS Special Focus on Computation and the Socio-Economic Sciences, co-Chair of organizing committee
- 2004-10: DIMACS Special Focus on Information Processing in Biology, Chair of Organizing Committee
- 2006-12: DIMACS/MBI African BioMathematics Initiative, Chair of Organizing Committee
- 2010-13: DIMACS Special Focus on Algorithmic Decision Theory, Chair of Organizing Committee
- 2012-15: DIMACS Special Focus on Energy and Algorithms, Organizing Committee
- 2012-16: Mathematics of Planet Earth 2013+, Chair of Organizing Committee
- 2013: Mathematics of Planet Earth, Organizing Committee

**Conferences Organized:**

- 1974: Program Committee, SIAM Annual Meeting
- 1975: Conference Chairman, SIMS Res. Applications Conference on Mathematics and Energy
- 1977: Program Chairman, SIAM 25th Anniversary Meeting
- 1978: Program Committee, SIAM Fall Meeting
- 1978: Symposium Chairman, IGT Symposium on Energy Modeling and Net Energy Analysis
- 1979: Symposium Chairman, IGT Symposium on Energy Modeling II
- 1979-81: Member, Steering Committee, Environmetrics '81
- 1980: Symposium Chairman, IGT Symposium on Energy Modeling III
- 1981: Symposium Chairman, SIAM Symposium on Applications of Discrete Mathematics
- 1981-82: Symposium Chairman, IGT Symposium on Energy Modeling IV
- 1982-83: Symposium Chairman, Second SIAM Symposium on Applications of Discrete Mathematics
- 1984-86: Conference Co-Chairman, Third SIAM Conference on Applications of Discrete Mathematics
- 1985: Program Committee, Graph Theory Day X
- 1985: Organizer of Minisymposium on Applications of Discrete Mathematics to Problems of Society, SIAM National Meeting
- 1985-86: Organizer, Advanced Research Institute on Discrete Applied Mathematics, Rutgers University
- 1986...: Program Chairman, Workshop on Applications of Combinatorics and Graph Theory in the Biological and Social Sciences, Institute for Mathematics & its Applications, University of Minnesota
- 1986-87: Organizer, Second Advanced Research Institute on Discrete Applied Mathematics, Rutgers University
- 1987: International Advisory Committee, First International Conference on Creative Studies, Shanghai, 1987.

- 1987-88: Organizer, Third Advanced Research Institute on Discrete Applied Mathematics, Rutgers University
- 1988-89: Organizer, Fourth Advanced Research Institute on Discrete Applied Mathematics, Rutgers University
- 1988-90: Program Committee, First Alaska Graph Theory Conference: Quo Vadis Graph Theory
- 1989: Co-Organizer, DIMACS Workshop on Reliability of Computer and Communication Networks, Rutgers University
- 1989-90: Organizer, Fifth Advanced Research Institute on Discrete Applied Mathematics
- 1990-91: Organizer, Sixth Advanced Research Institute on Discrete Applied Mathematics
- 1990-91: Organizer, Workshop on Graph Labellings, Northeastern University
- 1991: Organizer, Genome Day, DIMACS
- 1991-92: Organizer, Seventh Advanced Research Institute on Discrete Applied Mathematics
- 1992-93: Consulting Organizer, Conference on Graduate Programs in the Applied Mathematical Sciences, Clemson University, Clemson, SC
- 1993: Organizing Committee, International Conference on Ordinal Data Analysis, Amherst, Massachusetts
- 1996: Organizing Committee, DIMACS workshop on Mathematical Hierarchies and Biology
- 1996-97: Organizing Committee, DIMACS/DIMATIA Conference on the Future of Discrete Mathematics, Stirin Castle, Czech Republic
- 1996-98: Organizing Committee, Conference on Combinatorial and Global Optimization, Chania, Greece
- 1997: Organizing Committee, DIMACS Workshop on Mathematical Hierarchies and Biology
- 1998: Organizing Committee, Hong Kong University of Science and Technology DIMACS Far-East Workshop on Algorithms and Combinatorics, Hong Kong, 1998
- 1998: Organizing Committee, International Conference on Combinatorics Statistics, Pattern Recognition, and Related Areas, Mysore, India
- 1998: Organizing Committee, DIMACS Workshop on Combinatorial Clustering and Multi-domain Protein Structure
- 1998: Organizing Committee, DIMACS Workshop on Advances and Opportunities at the Biology-Math-Computation-Physical Sciences Interface
- 1998: Chair, A Celebration of DIMACS (DIMACS' 10th Anniversary Meeting)
- 1999: Organizing Committee, DIMACS Miniworkshop on Mathematical and Computational Approaches to Elections
- 1999-00: Organizing Committee, International Conference on Ordinal and Symbolic Data Analysis, Brussels, Belgium
- 2000: Organizing Committee, DIMACS Workshop on Bioconsensus
- 2000: Organizing Committee, DIMACS Workshop on Policy-driven Decision Making and Dynamic Interoperability
- 2001: Organizing Committee, DIMACS Workshop on Integration of Diverse

- Biological Data
- 2001: Organizing Committee, DIMACS Workshop on Bioconsensus II
  - 2001-02: Organizing Committee, DIMACS-National Chiao Tung University Conference on Interconnections among Codes, Designs, Graphs and Molecular Biology, Hsinchu, Taiwan
  - 2001-02: Organizer, Short Course: A Sampling of Applications of Graph Theory
  - 2005: Organizer, DIMACS-DIMATIA-Renyi Working Group Meeting on Graph Coloring and their Generalizations, Budapest
  - 2005: Organizing Committee, Governor Codey's School Security Summit, Rutgers University
  - 2005-06: Scientific Committee for Program on National Defense and Homeland Security, SAMSI (Statistical and Applied Mathematical Sciences Institute)
  - 2005: DIMACS Working Group on DNA and the Barcode of Life
  - 2005: DIMACS Epidemiology Minisymposium
  - 2005: Conference on Linking Mathematics and Biology in the High Schools, DIMACS
  - 2006: Experimental Analysis of Algorithms: Interfaces between Statistics and Computer Science, DIMACS
  - 2006: Workshop on Computational Optimization and Logistics Challenges in the Enterprise, Exxon-Mobil Research and Engineering, Annandale, NJ
  - 2006: DIMACS DIMATIA Renyi Combinatorial Challenges Meeting
  - 2006: The DNA Barcode Data Analysis Initiative (DBDAI): Developing Tools for a New Generation of Biodiversity Data, Paris
  - 2006: New Jersey Universities Homeland Security Research Consortium Symposium, Fairleigh Dickinson University
  - 2006: US-China Computer Science Leadership Summit, Beijing, China
  - 2006: Chair, DIMACS/AIMS/SACEMA Workshop on Facing the Challenge of Infectious Diseases in Africa: The Role of Mathematical Modeling, Johannesburg, South Africa
  - 2006: New Jersey Universities Homeland Security Research Consortium Symposium, Rutgers University
  - 2006: DIMACS/LAMSADE Workshop on Voting Theory and Preference Modeling Universite of Paris – Dauphine
  - 2007: Chair, DHS Center for Dynamic Data Analysis Kickoff Conference, Rutgers
  - 2007: Meeting Co-Chair, IEEE Conference on Intelligence and Security Informatics, New Brunswick, NJ
  - 2007: Chair, DIMACS/AIMS/SACEMA Advanced Study Institute and Workshop on Mathematical Modeling of Infectious Diseases of Africa, Cape Town and Stellenbosch, South Africa
  - 2007: Organizer, DIMACS Workshop on Recent Advances in Mathematics and Information Sciences for Analysis and Understanding of Massive and Diverse Sources of Data, Rutgers
  - 2007: Organizer, Workshop on The Mathematics of Homeland Security: Topics for High School Teachers, Department of Homeland Security Center of Excellence for Dynamic Data Analysis, Rutgers University
  - 2007: Organizer, DIMACS Bio-Math Connection (BMC) Field Testers Workshop

- (Computational Biology), Rutgers
- 2007: Organizer, Reconnect Conference on Data Analysis and Law Enforcement, Rutgers
- 2007: Organizing Committee, Symposium: The State of the Art in the Decision Sciences Location, University of Luxembourg
- 2007: Organizer, Mini Symposium on Discrete Science Applications in Homeland Security, Department. of Homeland Security Center of Excellence for Dynamic Data Analysis, Rutgers University
- 2008: Organizer, US-Africa Advanced Study Institute on Mathematical Modeling of Infectious Diseases in Africa, African Institute for Mathematical Sciences, Muizenberg, South Africa
- 2008: Organizer, Reconnect Conference on Mathematical Methods in Biosurveillance, Rutgers
- 2008: Organizer, Second US-China Computer Science Leadership Summit, Arlington, VA
- 2008: Organizer, DIMACS Bio-Math Connection (BMC) Field Testers Workshop (Epidemiology)
- 2008: Organizing Committee, Workshop on Modeling the Impact of Policy Options during Public Health Crises, Banff International Research Station
- 2008: Organizer, Workshop on Algorithmic Decision Theory, University of Paris-Dauphine
- 2008: Organizer, Workshop on Port Security/Safety, Inspection, Risk Analysis and Modeling, Rutgers
- 2008: Workshop on Mathematical Science Methods to Enhance Nuclear Detection, Rutgers
- 2008: Organizing Committee, Eighth New Jersey Universities Homeland Security Research Consortium Symposium Homeland Security: From Face Recognition to Disease Detection, Natural Disasters to Transit Security, Princeton University
- 2009: Organizer, DIMACS/CINJ BioMedical Informatics Summit, The Cancer Institute of NJ (CINJ), New Brunswick, NJ
- 2009: Organizing Committee, Clinic on Meaningful Modeling of Biological Data, African Institute for Mathematical Sciences
- 2009: Organizer, DIMACS Bio-Math Connection (BMC) Field Testers Workshop (Ecology and Population Biology), Rutgers
- 2009: Organizer, Advanced Study Institute and Workshop on Economic Epidemiology, Makerere University, Kampala, Uganda
- 2009: Organizer, Reconnect Conference on Visual Analytics and Applications, Rutgers
- 2009: Organizing Committee, International Conference on Algorithmic Decision Theory, Venice
- 2009: Organizer, DIMACS 20<sup>th</sup> Birthday Conference, Rutgers
- 2010: Organizing Committee, Miniworkshop on Algorithms and Energy, Rutgers
- 2010: Chair, Third US-China Computer Science Leadership Summit, Beijing, China
- 2010: Organizing Committee, DIMACS/MBI Clinic on Meaningful Modeling of

- Epidemiological Data, Muizenberg, South Africa
- 2010: Chair, CCICADA Kickoff Conference, Rutgers
- 2010: Chair, DIMACS/MBI Advanced Study Institute and Workshop on Conservation Biology, Southern African Wildlife College, Hoedspruit, Limpopo, South Africa
- 2010: Chair, Conference on Mathematical Challenges for Sustainability, Rutgers
- 2010: Co-Chair, Workshop on Evidence-based Policy Making, University of Paris Dauphine
- 2011: Organizing Committee, Advanced Study Institute on Conservation Biology, Kenya Wildlife Service Training Institute, Naivasha, Kenya
- 2011: Chair, US-China Computer Workshop on Collaborations in CS and Sustainability, Rutgers
- 2011: Co-Chair, DIMACS Sustainable Planet Education Program Workshop, Rutgers
- 2011: Co-Chair, International Conference on Algorithmic Decision Theory, Rutgers
- 2011: Organizing Committee, DIMACS/MBI Workshop on Genetics and Disease Control, Elmina, Ghana
- 2011: Co-Chair, Workshop on Smart Cities, University of Paris-Dauphine
- 2011: Organizing Committee, Maritime Risk Symposium – Developing Public-Private Partnerships in Homeland Security: How Risk Impacts Government Policy and Business Requirements, Rutgers
- 2012: Chair, DIMACS/MBI Workshop on Quantitative Landscape Ecology and Environmental Sustainability, University of Kwa-Zulu-Natal, Durban, South Africa
- 2012: Organizing Committee, Workshop on Algorithmic Aspects of Information Fusion, Rutgers
- 2012: Steering Committee, Maritime Risk Symposium: Reducing Costs and Increasing Effectiveness in the Maritime Environment, University of Southern California, Los Angeles
- 2014: Workshop Introducing Topics of Mathematics of Planet Earth 2013+, Arizona State University
- 2014: Organizing Committee Mathematics of Planet Earth 2013+ Workshop on Sustainable Human Environments, Rutgers
- 2015: Organizing Committee, Mathematics of Planet Earth 2013+ Workshop on Data-Aware Energy Use, UC San Diego
- 2015: Organizing Committee, Mathematics of Planet Earth 2013+ Workshop on Global Change, UC Berkeley
- 2015: Organizing Committee, Mathematics of Planet Earth 2013+ Workshop on Natural Disasters, Georgia Tech
- 2015: Organizing Committee, Mathematics of Planet Earth 2013+ Workshop on Management of Natural Resources, Howard University
- 2015: Organizing Committee, Mathematics of Planet Earth 2013+ Workshop on Education for the Planet Earth of Tomorrow, University of Tennessee
- 2015: Organizing Committee, International Workshop on Citizens Science, University of Paris-Dauphine

- 2015: Chair, Learning Seminar and Symposium on Maritime Cyber Security, Rutgers
- 2015: Research Chair, Maritime Cyber Research Summit, Cal Maritime
- 2016: Research Chair, Research Working Group on Maritime Cyber Security, Port of Long Beach, CA
- 2016: Research Chair, Research Working Group on Maritime Cyber Security, University of Southern California
- 2016: Co-chair, International Workshop on Modeling of Infectious Diseases, with a Focus on Ebola, Dakar, Senegal
- 2016; Organizing Committee, A Conversation on Venue Security After Paris, MetLife Stadium, NJ

**Miscellaneous Professional Activities:**

- 1974-76: SIAM Lecturer
- 1975: Outside Evaluation Committee, Mathematics Department, Allegheny College
- 1975: Outside Evaluation Committee, Program in Math and the Social Sciences, Dartmouth College
- 1976: Participant, MAA Workshop on Applied Math Modules, Cornell University
- 1976....: Member, MAA Consultant's Bureau
- 1977-78: Oversight Committee, NSF-RANN Project on Structural Models of Technology Assessment
- 1979-81: Member, State Energy Models Tech. Committee, Colorado School of Mines Research Institute
- 1980: Outside Evaluation Committee, Mathematics Department, SUNY/Plattsburgh
- 1982: Outside Evaluator, State University College at Buffalo
- 1983: Outside Member, Ph.D. Committee at New York University
- 1984: Member, Office of Naval Research Review Panel on Research Options
- 1984...: Member, Steering Committee, Mathematical Competition in Modeling
- 1985-87: Member, Committee on Applications of Mathematics, National Research Council
- 1985: Outside Evaluation Committee, Mathematics Department, Colgate University
- 1985: Outside Evaluation Committee, Computer Science Department, Hunter College
- 1986: Board of Visitors, Office of Naval Research Advisory Board
- 1987: Consultant visit to University of Hartford
- 1988: Board of Visitors, Office of Naval Research Advisory Board
- 1991: Committee of Visitors, Instructional Materials Development Program, National Science Foundation
- 1991-95: Visiting Lecturers Panel, MAA
- 1991: Member, National Science Foundation Review Panel on Statewide Initiatives in Science, Mathematics, and Engineering Education
- 1992....: External Advisory Board, Center for Theoretical Studies in the Physical Sciences, NSF Minority Excellence Center at Clark Atlanta University
- 1992: Chair of NSF Panel on the Role of Faculty from the Mathematical Science Disciplines in the Undergraduate Education of Science and Mathematics Teacher



- 1993: Committee of Visitors, Office of Special Projects, Division of Mathematical Sciences, NSF
- 1993: Co-Chair, External Review Committee, Graduate Program in the Mathematical Sciences, Clemson University, Clemson, SC
- 1993-97: Member, Working Group in Discrete Mathematics (Advisory Group for Discrete Mathematics in the Schools)
- 1994: NSF Panel on Instructional Materials Development
- 1994: Co-chair, External Review Committee, Department of Mathematics, University of Colorado, Denver
- 1994: Committee of Visitors, Instructional Materials Development Program, Division of Elementary, Secondary, and Informal Science Education, NSF
- 1999: Senior Researcher and Panel Organizer, NSF Career PI Meeting
- 2001: Participant, NSF International REU Best Practices Workshop
- 2002: Participant, NIH Consultation on Smallpox Modeling
- 2002: Participant, Secretary of HHS Emergency Preparedness Modeling Group
- 2003: Participant, NSF-NIH Symposium on Math-Biology Linkages
- 2003: Participant, NIH Models of Infectious Disease Agents Study Review Committee, 2003
- 2003: Participant in Conference on Mathematical Modeling of Spread of Agricultural Bioterrorism Agents, MITRE Corporation, McLean, VA
- 2003: Panelist at NIH BISTI (Biomedical Information Science and Technology Initiative) Symposium: Digital Biology: The Emerging Paradigm, Bethesda, MD
- 2003...: Representative to NJ State Regional Homeland Security Technology Council
- 2004: Invited participant at ASA/INFORMS Workshop on OR-Stat, Santa Fe, NM
- 2004...: Co-Chair, New Jersey Universities Homeland Security Research Consortium
- 2004...: Steering Committee, Rapid Response Institute, Monmouth University
- 2005: Invited participant: AFMIC, ITIC, DHS Conference on Avian Influenza: Threat to Homeland Security, Chantilly, VA
- 2006: Leader, National Science Foundation-CISE US Computer Science Leadership Delegation to China
- 2006...: Member, State of New Jersey Domestic Security Preparedness Planning Group
- 2007: Invited participant, Center for Disease Control (CDC) Preparedness Modeling Conference, Atlanta, GA
- 2011-12: Chair NSF Mathematical and Physical Sciences Advisory Committee Subcommittee on Name of Division of Mathematical Sciences
- 2012...: Co-Chair, NSF Committee on Support for the Statistical Sciences at NSF
- 2014...: Member, Science and Technology Project Management Committee, NJ Office of Homeland Security and Preparedness
- 2016: Delegate to Next Einstein Forum, Dakar, Senegal
- 2016: Chair, Science and Technology Centers Selection Committee, National Science Foundation

**Educational Programs Organized:**

- 1989...: Organizer and Lecturer, DIMACS Leadership Program (high school teachers,

- later K-8)
- 1989...: Organizer and Lecturer, DIMACS Young Scholars Program (high school students)
- 1992-11: Director, DIMACS Research Experiences for Undergraduates International REU Program
- 1996-99: Director, DIMACS Research and Education Institute (DREI) (researchers plus high school teachers), Director
- 1998...: Director, Reconnect Program for College Faculty (after 2009 Assistant Director)
- 1999...: DIMACS Educational Modules Series
- 2000-04: Director, DIMACS Connect Institute (DCI) (researchers plus high school teachers)
- 2004-07: Director, DIMACS BioMath Connect Institute (researchers plus high school teachers)
- 2006...: Director, DyDAn and CCICADA Research Experiences for Undergraduates Program
- 2006-12: Director, DIMACS BioMath Connection (modules for high schools)
- 2010...: Director, DIMACS Program on Integrating Mathematics and Biology (modules, a course, and a book for high schools)
- 2011... Co-Chair, DIMACS Sustainable Planet Education Program: One Day Sustainability Modules for Mathematics Classes

**Selected Homeland Security Research Programs Directed:**

- 2007-10: A Decision Logic Approach to the Port of Entry Inspection Problem, supported by NSF and ONR
- 2007-10: Enhancing Force Deployment in Law Enforcement and Counter-terrorism Using Data Analytics, with Port Authority of New York/New Jersey
- 2007-12: Sensor Management for Nuclear Detection, supported by Domestic Nuclear Detection Office (DNDO)
- 2010-11: Stadium Evacuation Analysis Project, DHS
- 2010-12: Urban Commerce and Security Study for DHS Office of University Programs
- 2011: Development of Smart Phone Apps that Connect to the Incident Command Function of the Hippocrates Situational Awareness System, NJ Department Of Health and Senior Services
- 2011-12: Using Social Media for Alerts and Warnings, for DHS First Responders Group
- 2011-12: Modeling of Offsite Container Inspection Processes for US Customs and Border Protection (CBP)
- 2011-12: Fusion Center Data Analysis and Assessment, DHS Office of Intelligence & Analysis
- 2011-12: Flood Mitigation on the Raritan River, for Federal Emergency Management Agency (FEMA)
- 2012: Coast Guard Boat Allocation Problem
- 2012: A Targeted Risk-based Approach to Fisheries Law Enforcement in the First Coast Guard District
- 2012-14: Safety Act: Best Practices for Stadium Security, for DHS Office of Safety

- Act Implementation
- 2012-14: Aviation Capability and Capacity Assignment Module (ACCAM), US Coast Guard
  - 2013-14: Unaccompanied Alien Children, ICE, CBP, HHS
  - 2013-15: Metrics for the Southern Border, CBP, US Coast Guard
  - 2013-15: Coast Guard Boat Allocation Problem II: Sharing
  - 2014-15: Safety Act: Metrics for Stadium Security, for DHS Office of Safety Act Implementation
  - 2015-...: Maritime Cyber Security: with US Coast Guard
  - 2015-16: Government Inspections of Domestic Cargo: Impact and Implications

**Rutgers Activities:****Departmental:**

## Mathematics Department:

Applied Math Committee, member since 1972 and chairman 5 terms  
 Personnel Planning Committee - various terms  
 Undergraduate Committee - various terms  
 Graduate Committee, 1984-1986  
 Many ad hoc committees

## RUTCOR:

Executive Committee, many terms  
 Personnel Committee, many terms  
 Admissions Committee, many terms  
 Many ad hoc committees

## Graduate School of Education:

Search Committee, Faculty in Mathematics Education, 2000-2003

**University-Wide:**

Physical Sciences Curriculum Committee, 3 terms  
 Provost's Committee on School of Business, 1984-1985  
 Director, Rutgers Center for Operations Research, 1982-1983  
 Executive Committee, Center for Computer Aids to Industrial Productivity, 1982-1985  
 Graduate Director, Interdisciplinary Ph.D. Program in OR, 1984-1989  
 CAIP Review Panel, 1986  
 University Speakers Bureau, 1988 ...  
 Representative to Executive Committee, Center for Discrete Mathematics and Theoretical Computer Science, 1988-1993, 1994-1995  
 Associate Director, Center for Discrete Mathematics and Theoretical Computer Science, 1989-1992  
 Member, Search Committee for Dean of School of Business, Rutgers Camden, 1989  
 Member, New Brunswick Faculty Senate Committee on Educational Policy, 1990-1991  
 Acting Director, Center for Discrete Mathematics and Theoretical Computer Science, 1991, 1992-1993  
 Member, Faculty Advisory Board, Center for Computer Aids to Industrial Productivity, 1991-2005  
 Member, Provost's Committee on the National Transit Institute, 1992  
 Research Advisory Board, 1992-1993, 1993-1994, 1998 ...  
 University Awards Committee, 1992-1993, 1993-1994  
 Provost's Committee on Strategic Planning in Continuing Education, 1993  
 Advisory Committee on Appointments and Promotions to Professor I - Math and

Natural Sciences, Faculty of Arts & Sciences, 1993-1994  
Organizer, Ad hoc Interdisciplinary Committee to Update the BioMath Major, 1994-1995  
Program Committee for Science and Engineering Resource Center, Phase II (SERC II), 1995-1996  
President's Committee on Implementation of the Strategic Plan: Information Science and Related Fields, 1995  
Director, Center for Discrete Mathematics and Theoretical Computer Science, 1996-2011; Emeritus Director 2011 ...  
Rutgers Council on Governmental Relations, 1996 ...  
Participant, Rutgers Delegation to Coalition for National Science Funding, Congressional Display, 1996  
Member, Search Committee for Dean of Engineering, 1996-1998  
Member, Science Cabinet, 1997-1999  
Member, Information Sciences Council/Information Sciences and Technology Council, 1997-2007  
Executive Committee, Center for Math, Science and Computer Education (CMSCE), 1999 ...  
Organizer, Rutgers Delegation to Coalition for National Science Funding, Congressional Display, 2000  
Member, High Speed Network Applications Committee, 2000-2001  
Presentation on Mathematical Sciences and Bioterrorism to National Issues Subcommittee, Board of Trustees, Rutgers, 2002  
Chair, Rutgers University Homeland Security Research Initiative (RUHSRI), 2003...  
Coordinator, Rutgers Telecommunications Proposals to NJ Commission on Jobs, Growth, and Economic Development, 2003  
Member, Rutgers-Piscataway Arsenal Coordinating Committee, 2003-2005  
Faculty Advisor, Rutgers Student University Anti-Terrorism Coalition, 2004-2005  
Member, Committee to Evaluate CAIP, 2004  
Chair, Research Advisory Board Investigating Committee, 2004-2005  
Member, Committee to Evaluate Dean of Arts and Sciences, 2005-2006  
Computing Consortium Committee, 2005 ...  
Rutgers Representative to Executive Board of University Center for Disaster Preparedness and Emergency Response (a joint activity of Rutgers, University of Medicine and Dentistry of NJ, and Robert Wood Johnson University Hospital), 2006 ...  
Chair, Search Committee for Director of Institute of Marine and Coastal Sciences, 2007-2008  
Co-Director, Laboratory of Port Security, 2006 ...  
Rutgers Discovery Informatics Institute (RDII) Internal Advisory Board  
Internal Advisory Board, Institute for Emergency Preparedness & Homeland Security

**Ph.D. Students:**

<u>Student</u>	<u>Year of Ph.D.</u>	<u>Current Position</u>
Rochelle Leibowitz	1978	Professor, Wheaton College
Margaret Cozzens	1981	Research Faculty, DIMACS, Rutgers University; formerly President of Colorado Institute of Technology; Provost, University of Colorado-Denver; and Division Director, at NSF
Robert Opsut	1984	Assistant to Surgeon General, US Air Force
Arundhati Raychaudhuri	1985	Professor, College of Staten Island
Suh-ryung Kim	1988	Professor, Seoul National University, Seoul, S. Korea
Barry Tesman	1989	Professor, Dickinson College, holder of the Mathias Chair
Sam Rosenbaum	1990	Instructor, Bard High School Early College
Garth Isaak	1990	Professor and Associate Dean for Research and Graduate Studies, Lehigh University
Chi Wang	1991	Associate Professor, University of Louisville, and New Media Department, J. Walter Thompson, USA, Detroit, MI
Denise Sakai Troxell	1992	Associate Professor, Babson College
Dale Peterson	1995	Faculty, U.S. Air Force Academy
Aleksandar Pecec	1996	Associate Professor, Duke University (School of Business)
Shaoji Xu	1998	Senior SAS Programmer at Allergan
Li Sheng	1998	Associate Professor, Drexel University
Paul Dreyer	2000	Professional Staff, Jane Street Capital; previously Research Staff, RAND Corporation
Stephen Hartke	2004	Associate Professor, University of Nebraska

**Publications:****Books Authored:**

1. *Discrete Mathematical Models, with Applications to Social, Biological and Environmental Problems*, Prentice-Hall, Englewood Cliffs, NJ, 1976.
  - 1a. Russian translation of #1, Nauka, Moscow, 1986.
2. *Graph Theory and its Applications to Problems of Society*, NSF-CBMS Monograph #29, SIAM Publications, Philadelphia, 1978.
3. *Measurement Theory, with Applications to Decisionmaking, Utility, and the Social Sciences*, Addison Wesley, Reading, MA, 1979. (Book in the Encyclopedia of Mathematics and its Applications series.)
  - 3a. Digital printing, Cambridge University Press, 2009.
4. *Applied Combinatorics*, Prentice-Hall, Englewood Cliffs, NJ, 1984.
5. *Applied Combinatorics, Second Edition*, (with Barry Tesman), Pearson Prentice Hall, Upper Saddle River, NJ, 2004.
  - 5a. New edition, 2009: Chapman&Hall/CRC, an imprint of Taylor&Francis, including added section with answers to selected exercises, 2009, 860 pages.
  - 5b. Chinese paperback edition (in English), Pearson Education Asia, 2005.
  - 5c. Simplified Chinese edition (in Chinese), Pearson Education Asia and China Machine Press, 2007.

**Books Edited:**

1. *Energy: Mathematics and Models*, F.S. Roberts (ed.), SIAM Publications, Philadelphia, 1976.
2. *Energy Modeling and Net Energy Analysis*, F.S. Roberts (ed.), Inst. of Gas Technology, Chicago, 1979.
3. *Energy Modeling II: The Interface Between Model Builder and Decision Maker*, F.S. Roberts (ed.), Inst. of Gas Technology, Chicago, 1980.
4. *Energy Modeling III: Dealing with Energy Uncertainty*, F.S. Roberts (ed.), Inst. of Gas Technology, Chicago, 1981.
5. *Energy Modeling IV: Planning for Energy Disruptions*, F.S. Roberts (ed.), Inst. of Gas

Technology, Chicago, 1982.

6. *Discrete and System Models*, W.F. Lucas, F.S. Roberts, & R.M. Thrall (eds.), Springer-Verlag, NY, 1983.
- 6a. Chinese translation of #6, National University of Defense Technology, University Press, Changsha, Hunan, People's Republic of China, 1997.
7. *Applications of Discrete Mathematics*, R.D. Ringeisen and F.S. Roberts (eds.), SIAM, Philadelphia, 1988.
8. *Applications of Combinatorics and Graph Theory in the Biological and Social Sciences*, F.S. Roberts (ed.), Vol. 17 of IMA Volumes in Mathematics and its Applications, Springer-Verlag, New York, 1989.
9. *Reliability of Computer and Communication Networks*, F. Hwang, C. Monma and F.S. Roberts (eds.), DIMACS Series, Volume 5, American Mathematical Society and Association of Computing Machinery, Providence, RI, 1991.
10. *Discrete Mathematics in the Schools*, J. Rosenstein, D. Franzblau, and F.S. Roberts (eds.), DIMACS Series, Vol. 36, American Mathematical Society, Providence, RI, 1997. (Co-published by National Council of Teachers of Mathematics.).
11. *Mathematical Hierarchies and Biology*, B. Mirkin, F.R. McMorris, A. Rzhetsky, and F.S. Roberts (eds.), DIMACS Series, Vol. 37, American Mathematical Society, Providence, RI, 1997.
12. *Recent Trends in Mathematical Psychology: Psychophysics, Knowledge Representation, Cognition, and Measurement*, C.E. Dowling, F.S. Roberts, and P. Theuns (eds.), Lawrence Erlbaum Associates, Mahwah, NJ, 1998.
13. *Mathematical Support for Molecular Biology*, M. Farach, F.S. Roberts, M. Vingron, and M. Waterman (eds.), DIMACS Series, Vol. 47, American Mathematical Society, Providence, RI, 1999.
14. *Contemporary Trends in Discrete Mathematics*, R.L. Graham, J. Kratochvil, J. Nešetřil, and F.S. Roberts (eds.), DIMACS Series, Vol. 49, American Mathematical Society, Providence, RI, 1999.
15. *Bioconsensus*, M. Janowitz, F.-J. Lapointe, B. Mirkin, F.R. McMorris, and F.S. Roberts (eds.), DIMACS Series, Vol. 61, American Mathematical Society, Providence, RI, 2003.
16. *Intelligence and Security Informatics (Proceedings of the IEEE International Conference ISI 2005)*, Paul Kantor, Gheorge Muresan, Fred Roberts, Daniel D. Zeng, Fei-Yue Wang, Hsinchun Chen, Ralph C. Merkle (eds.), Lecture Notes in Computer Science, LNCS 3495, Springer Verlag, Berlin and Heidelberg, 2005.



17. *Graphs and Discovery*, S. Fajtlowicz, P.W. Fowler, P. Hansen, M.F. Janowitz and F.S. Roberts (eds.), DIMACS Series, Vol. 69, American Mathematical Society, Providence, RI, 2005.
18. *The Mathematics of Preference, Choice and Order: Essays in Honor of Peter C. Fishburn*, S. Brams, W.V. Gehrlein, and F.S. Roberts (eds.), Springer-Verlag, 2009.
19. *Bio-Math in the Schools*, M. Cozzens, and F.S. Roberts (eds.), DIMACS Volume Series, American Mathematical Society, Providence, RI, Vol. 76, 2011.
20. *Mathematical and Statistical Challenges for Sustainability*, M. Cozzens and F.S. Roberts (eds.), American Mathematical Society, Providence, RI, 2011.
21. *Algorithmic Decision Theory*, R.I. Brafman, F.S. Roberts, and A. Tsoukias (eds.), Lectures Notes in Artificial Intelligence, Springer-Verlag, Berlin/Heidelberg, 2011, Volume LNAI 6992.
22. *Homeland Security Achievements at CCICADA*, C. Biddle, M. Cozzens, and F.S. Roberts (eds.), in preparation.
23. *Maritime Cyber Security*, J. DiRenzo III, N. Drumhiller, and F.S. Roberts (eds.), PSO/Westphalia Press, in preparation.
24. *Mathematics of Planet Earth*, H. Kaper and F. S. Roberts (eds.), Springer-Verlag, in preparation.

#### **Book Reviews:**

1. Review of Anatol Rapoport: *Mathematical Models in the Social and Behavioral Sciences*, *Contemporary Psychology*, **29** (1984), 990.

#### **Articles:**

1. Some problems in the geometry of visual perception (with P. Suppes), *Synthese*, **17** (1967), 173-201.
2. Axiomatic thermodynamics and extensive measurement (with R.D. Luce), *Synthese*, **18** (1968), 311-326.
3. Indifference graphs, in F. Harary (ed.), *Proof Techniques in Graph Theory*, Academic Press, NY, 1969, 139-146.
4. On the boxicity and cubicity of a graph, in W.T. Tutte (ed.), *Recent Progress in Combinatorics*, Academic Press, NY, 1969, 301-310.

5. A characterization of clique graphs (with J. Spencer), in R. Guy, H. Hanani, N. Sauer, and J. Schonheim (eds.), *Combinatorial Structures and Their Applications*, Gordon and Breach, NY, 1970, 367-368.
6. A new characterization of partial orders of dimension two (with K.A. Baker and P.C. Fishburn), *Annals of NY Acad. of Sci.*, **175** (1970), 23-24.
7. Intersection graphs of families of convex sets with distinguished points (with W.F. Ogden), in R. Guy, H. Hanani, N. Sauer, & J. Schonheim (eds.), *Combinatorial Structures and Their Applications*, Gordon and Breach, NY, 1970, 311-313.
8. On nontransitive indifference, *Jour. of Math. Psychology*, **7** (1970), 243-258.
9. A characterization of clique graphs (with J. Spencer), *Jour. of Comb. Theory*, **10B** (1971), 102-108 (an expanded version of #5).
10. Homogeneous families of semiorders and the theory of probabilistic consistency, *Jour. of Math. Psychology*, **8** (1971), 248-263.
11. On the compatibility between a graph and a simple order, *Jour. of Combinatorial Theory*, **11** (1971), 28-38.
12. Signed digraphs and the growing demand for energy, *Environment and Planning*, **3** (1971), 395-410.
13. Noise pollution: The unseen problem, *Coast Environment*, **1** (1971), 13-15.
14. A derivation of a measure of relative balance for signed digraphs and a characterization of extensive ratio systems (with R.Z. Norman), *Jour. of Math. Psychology*, **9** (1972), 66-91.
15. A measure of relative balance for social structures (with R.Z. Norman), in J. Berger, M. Zelditch and B. Anderson (eds.), *Structural Theories in Progress, II*, Houghton-Mifflin, NY, 1972, 358-391.
16. Partial orders of dimension 2 (with K.A. Baker & P.C. Fishburn), *Networks*, **2** (1972), 11-28.
17. What if utility functions do not exist?, *Theory and Decision*, **3** (1972), 126-139.
18. A note on Fine's axioms for qualitative probability, *Annals of Probability*, **1** (1973), 484-487.
19. Building and analyzing an energy demand signed digraph, *Environment and Planning*, **5** (1973), 199-221.

20. Tolerance geometry, *Notre Dame Jour. of Formal Logic*, **14** (1973), 68-76.
21. Laws of exchange and their applications, *SIAM Jour. of Applied Math.*, **26** (1974), 260-284.
22. Structural characterizations of stability of signed digraphs under pulse processes, in R. Bari & F. Harary (eds.), *Graphs and Combinatorics*, Springer Verlag Lecture Notes #406 1974, 330-338.
23. Signed digraphs and the energy crisis (with T.A. Brown), *Amer. Math. Monthly*, **82** (1975), 577-594.
24. Weighted digraph models for the assessment of energy use and air pollution in transportation systems, *Environment and Planning*, **7** (1975), 703-724.
25. Structural analysis of energy systems, in F.S. Roberts (ed.), *Energy: Mathematics and Models*, SIAM Publications, 1976, 84-101.
26. Commuter transportation and the energy crisis, in R. Axelrod (ed.), *The Structure of Decision*, Princeton University Press, 1976, 142-179.
27. Graphs, garbage, and a pollution solution, in D.P. Maki and M. Thompson (eds.), *Mathematical Models in the Undergraduate Curriculum*, Proc of Conference held at Indiana University, 1976, 58-94.
28. On the theory of uniqueness in measurement (with C.H. Franke), *Jour. of Math. Psychology*, **14** (1976), 211-218.
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