

Dr. Tanya Y. Berger-Wolf

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Research Interests:

Application of combinatorial optimization analysis and algorithm design techniques to problems in population biology of plants, animals, and humans, from genetics to social interactions.

Employment:

- Present **Assistant Professor**, Department of Computer Science, University of Illinois, Chicago
Adjunct Professor, Department of Bioengineering, University of Illinois, Chicago
- 2004-2005 **Postdoctoral Fellow**
Center for Discrete Mathematics and Theoretical Computer Science (DIMACS)
- 2002-2004 **Postdoctoral Fellow**
Department of Computer Science and Laboratory for High-Performance Algorithm Engineering and Computational Molecular Biology, University of New Mexico
- 2001 **Visiting Lecturer**
Department of Computer Science, University of Illinois, Urbana-Champaign
- Aug 2000 **Research Assistant**
Sandia National Laboratory
- 1996-1998 **Teaching assistant**
Department of Computer Science, University of Illinois, Urbana-Champaign
- 1995-1996 **Research programmer**
Geographic Modeling Lab, University of Illinois, Urbana-Champaign
- 1994-1995 **GIS programmer**
Malam Group, Jerusalem, Israel.
- 1993-1994 **GIS programmer and administrator**
Hebrew University Geographic Information Systems Center, Jerusalem, Israel
Research Programmer
Ecology, Systematics and Evolution Dep., Hebrew University, Jerusalem, Israel
- 1992-1993 **Instructor**, extracurricular studies in mathematics,
Youth Science Center of the Hebrew University, Jerusalem, Israel
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Education and Professional Preparation:

- 2004-2005 **Center for Discrete Mathematics and Theoretical Computer Science (DIMACS)**
NSF Postdoctoral Fellow
Computational epidemiology and population biology
Advisors: Simon A. Levin (Princeton) and S. Muthukrishnan (Rutgers)
- 2002-2004 **University of New Mexico**
NSF Postdoctoral Fellow
Computational methods for controlled breeding programs and phylogeny reconstruction
Advisors: Bernard M. E. Moret, David A. Bader
- 1996-2002 **University of Illinois, Urbana-Champaign**
Ph.D. in Computer Science, May 2002
Thesis: *Multichannel Communication and Graph Vertex Labeling*
Advisor: Edward M. Reingold
- 1991-1995 **Hebrew University, Jerusalem, Israel**
B.Sc., Computer Science and Mathematics (double major), July 1995

Awards and Honors:

NSF Postdoctoral Fellowship, 2004-2005
NSF Postdoctoral Fellowship, 2002-2004
NSF Graduate Fellowship, 1998-2000
UIUC Outstanding Graduate Student Service Award, 2001
Mavis Memorial Fund Scholarship, 2000 (*Eng. Col. award for excel. in research and education*)
C.W. Gear Outstanding Graduate Student Award, 2000
SIAM student conference travel award, 2000

Publications:

Journals:

- [1] T. Y. Berger-Wolf, S. I. Sheikh, B. DasGupta, M. V. Ashley, I. C. Caballero, W. Chaovalitwongse, S. L. Putrevu, "Reconstructing Sibling Relationships in Wild Populations", *Bioinformatics*, 23(13), to appear.
- [2] T. Y. Berger-Wolf, C. Moore, and J. Saia, "A computational approach to animal breeding" *Journal of Theoretical Biology*, 244(3), Feb 2007, 433–439. DOI: 10.1016/j.jtbi.2006.08.028
- [3] W. Chaovalitwongse, T. Y. Berger-Wolf, B. DasGupta, and M. V. Ashley. "Set covering approach for reconstruction of sibling relationships", *Optimization Methods and Software (Special Issue on Systems Analysis, Optimization and Data Mining in Biomedicine)*, 22(1), Feb 2007, 11–24. DOI: 10.1080/10556780600881829.
- [4] T. Y. Berger-Wolf, W. E. Hart, and J. Saia. "Discrete sensor placement problems in distribution networks." *Journal of Mathematical and Computer Modelling*, 42 (13): 1385-1396 Dec 2005
- [5] T. Y. Berger-Wolf and E. M. Reingold. "Index assignment for multichannel communication under failure." *IEEE Transactions on Information Theory*, 48(10), Oct 2002, 2656–2668

Refereed Conferences:

- [6] C. Tantipathananandth, T. Y. Berger-Wolf, and D. Kempe, "A Framework For Community Identification in Dynamic Social Networks", *Proceedings of the 13th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining, August 2007, San Jose, CA, USA*
- [7] T. Y. Berger-Wolf, S. I. Sheikh, B. DasGupta, M. V. Ashley, I. C. Caballero, W. Chaovalitwongse, S. L. Putrevu, "Reconstructing Sibling Relationships in Wild Populations", *15th Annual International Conference on Intelligent Systems for Molecular Biology (ISMB), July 2007, Vienna, Austria* [same as Bioinformatics publication in journals]
- [8] M. Lahiri and T. Y. Berger-Wolf, "Structure Prediction in Temporal Networks using Frequent Subgraphs", *IEEE Symposium on Computational Intelligence and Data Mining (CIDM), April, 2007, Honolulu, Hawaii*
- [9] S. Sheikh, T. Y. Berger-Wolf, W. Chaovalitwongse, B. DasGupta, and M. Ashley, "Reconstructing Sibling Relationships from Microsatellite Data", *European Conf. on Computational Biology (ECCB), Jan 2007, Eilat, Israel*
- [10] M. Laifenfeld, A. Trachtenberg, and T. Y. Berger-Wolf, "Identifying Codes and the Set Cover Problem", *44th Annual Allerton Conf. on Communication, Control, and Computing, Sept 2006, Allerton, IL*
- [11] T. Y. Berger-Wolf and J. Saia, "A framework for analysis of dynamic social networks", *Proceedings of the 12th ACM SIGKDD International Conference on Knowledge Discovery and Data Mining (KDD), August 2006, Philadelphia, PA, USA, 523–528*
- [12] T. Y. Berger-Wolf, B. DasGupta, W. Chaovalitwongse, and M. V. Ashley. "Combinatorial reconstruction of sibling relationships" *Proceedings, 6th International Symposium on Computational Biology and Genome Informatics (CBGI), Salt Lake City, Utah, July 21 - 26, 2005, 1252-1255*
- [13] T. Y. Berger-Wolf. "Online Consensus and Agreement of Phylogenetic Trees." In Inge Jonassen, Junhyong Kim (Eds.): *Algorithms in Bioinformatics, 4th International Workshop (WABI), Bergen, Norway, September 17-21, 2004, Proceedings. Lecture Notes in Computer Science, 3240, Springer, 350–361*
- [14] T. Y. Berger-Wolf and E. M. Reingold. "Optimal multichannel communication under failure." *Proceedings, 10th Annual ACM-SIAM Symposium on Discrete Algorithms (SODA), 1999, 858–859*

Book Reviews:

- [15] Invited book review of “Bioconsensus” (DIMACS Series in Discrete Mathematics and Theoretical Computer Science, Vol. 61) edited by M. F. Janowitz, F.-J. Lapointe, F. R. McMorris, B. Mirkin, and F. S. Roberts, *Journal of Systematic Biology*, 53(3), June 2004, 515–517

Others:

- [16] L. D. Hopkins, D. M. Johnston, T. Y. Berger-Wolf, C. Ellis, and L. Henne. “Assessing the Effects of Ecosystem Disturbance on Biodiversity in the Arid and Semi-arid Environments of the American Southwest.” *Design Report for a Geographical Modeling System, in partial fulfillment of contract #DACA88-95-C0019, 1997, UIUC.*

Invited Lectures:

“A Framework for Analysis of Dynamic Social Networks”

- Feb 2007 Department of Computer Science, Texas A&M U
Oct 2006 Department of Computer Science, U Southern California
Sep 2006 Database and Information Systems Seminar, UIUC
Oct 2005 Talk Series on Networks and Complex Systems, Indiana U
Sep 2005 Department of Computer Science, U Toronto

“Who’s Company? Identifying Persistent Social Groups”

- Jul 2005 Research Experience for Undergraduates at DIMACS
Apr 2005 Celebration of Women in Computing, UIUC

“Reconstructing Phylogenetic Trees: How Good Is Good Enough?”

- Oct 2004 Symposium on Computational Science of Biomolecules: Applications in Medicine and Therapeutics, UI Chicago
Dept of Computer Science, Illinois Institute of Technology

“How to See a Tree for a Forest? Combining Phylogenetic Trees: Reasons, Methods, and Consequences”

- Mar 2004 Department of Computer Science, George Washington U
Department of Computer Science, UI Chicago
School of Computer Science, U Central Florida

“Computational Phylogenetic Methods for Heterogeneous Data”

- Nov 2003 Department of Computer Science, U Connecticut

“Combinatorial Problems in Computational Biology”

- Oct 2003 Microsoft Research, Redmond, WA

“Controlled Breeding Problem”

- Dec 2002 Department of Computer Science, UIUC

“Multichannel Communication and Graph Vertex Labeling”

- Apr 2002 Department of Computer Science, U Southern California

“Bandwidth of Cartesian Products of Cliques”

- Nov 2001 Department of Mathematics, UIUC

“Multichannel Communication and Vertex Numbering of Graph Products”

- Apr 2001 AT&T Shannon Laboratory, Florham Park, NJ
Mar 2001 T. J. Watson Research Center, IBM, Yorktown Heights, NY
Bell Labs, Lucent Technologies, Murray Hill, NJ

“Graph Vertex Ordering and Integer Isoperimetric Problems”

- Nov 2000 Hebrew University, Jerusalem, Israel

Conference and Workshop Presentations:

- Jan 2007 *"Reconstructing Sibling Relationships from Microsatellite Data"*
"A Framework for Analysis of Dynamic Social Networks" (poster)
European Conference on Computational Biology (ECCB), Eilat, Israel
- Aug 2006 *"A Framework for Analysis of Dynamic Social Networks"*
ACM SIGKDD International Conference, Philadelphia, PA
- Aug 2006 *"A Computational Framework for Analysis of Dynamic Social Structures"* (poster)
14th Annual International Conference on Intelligent Systems in Molecular Biology, Fortaleza, Brazil
- Jul 2006 *"Analysis of Dynamic Social Networks"*
Microsoft Research Faculty Summit
- Jun 2006 *"Combinatorial Dynamics of Population Biology"* (Invited speaker)
SIAM Conference on Discrete Mathematics, Victoria, British Columbia, Canada
- May 2006 *"A Framework for Analysis of Dynamic Social Networks"* (Invited speaker)
Classification Society of North America 2006 Meeting on Network Data Analysis and Data Mining,
DIMACS Center, Piscataway, NJ
- Oct 2005 *"A Framework for Analysis of Dynamic Social Networks"* (Invited speaker)
American Mathematical Society Southeast Section Meeting, Special Session on Discrete Models in
Biology, Johnson City, TN
- May 2005 *"Combinatorial Reconstruction of Sibling Groups"* (poster)
9th Annual International Conference on Research in Computational Molecular Biology (RECOMB),
Boston, MA
- Sep 2004 *"Online Consensus"*
4th Workshop on Algorithms in Bioinformatics (WABI), Bergen, Norway
- Jun 2004 *"Computational Methods for Comparing Controlled Animal Breeding Strategies"*
Computational and Mathematical Population Dynamics, Trento, Italy
- Jun 2003 *"Comparison of Phylogenetic Consensus Methods"*
Evolution 2003 Conference, Chico, CA
- Aug 2002 *"Spirals, grids, and herringbones"*
11th SIAM Conference on Discrete Mathematics, San Diego, CA
- Dec 2000 *"Bandwidth of Products of Cliques"*
Midwest Theory Day, Chicago, IL
- Jun 2000 *"The Width and Length of Graph Products"*
10th SIAM Conference on Discrete Mathematics, Minneapolis, MN
- Aug 1999 *"Optimal Multichannel Communication Under Failure"*, poster
Dan Kleitman's 65th Birthday Celebration Conference, MIT, Cambridge, MA
- Jan 1999 *"Optimal Multichannel Communication Under Failure"*
10th ACM-SIAM Symposium on Discrete Algorithms, Baltimore, MD

Grants:

- NSF Grant IIS-0612044, *Collaborative Research: SEI: Computational Methods for Kinship Reconstruction*, \$608,205, 2006-2009 (PI: T.Y. Berger-Wolf, co-PIs: M. V. Ashley, B. DasGupta, W. Chaovalitwongse)
- Microsoft award 14936, *Computational Tools for Population Biology*, \$91,000, 2006-2007

Teaching Experience:

Spr 2007	<i>Computational Analysis of Networks</i> (UIC, graduate)
Fall '05&'06&'07	<i>Computer Algorithms I</i> (UIC, graduate and senior undergrad)
Spr 2006	<i>Algorithms in Computational Biology</i> (UIC, graduate)
Fall 2003	<i>Inexact Algorithms</i> (UNM, advanced graduate)
Fall 2001	<i>Numerical Linear Algebra</i> (UIUC, graduate and senior undergraduate)
Sum 2001	<i>Introduction to Theory of Computation</i> (UIUC, introductory undergraduate)
Sum 1999	<i>Computer Science Unplugged</i> (UIUC, discover course for non-technical majors)
Fall 1997	<i>Numerical Analysis</i> (UIUC, graduate and senior undergraduate, teaching assistant)
Sum 1997	<i>Combinatorial Algorithms</i> (UIUC, graduate and senior undergraduate, teaching assistant)
Spr 1997	<i>Discrete Mathematical Structures</i> (UIUC, introductory undergraduate, teaching assistant)
Fall 1996	<i>Introduction to Computer Science</i> (UIUC, introductory for engineering majors, teaching assistant)

Students Supervised:

- Mayank Lahiri, Ph.D. student, UIC, expected graduation 2010
- Habiba Habiba, Ph.D. student, UIC, expected graduation 2010
- Saad Sheikh, Ph.D. student, UIC, expected graduation 2010
- Chayant Tantipathananadh, Ph.D. student, UIC, expected graduation 2012
- Chayant Tantipathananadh, M.S. student, UIC, graduated in May 2007. Thesis: *Community Identification in Dynamic Social Networks Using Generalized Coloring*
- Andrea Franchescini, M.S. student, UIC, graduated in May 2007. Thesis: *A software architecture for the analysis of genomic protein family and domain controlled annotations*
- Satya Lahari Putrevu, M.S. student, UIC, expected graduation December 2007
- Charanjith Reddy Kunduru, M.S. student, UIC, expected graduation May 2008

Member of Thesis Committee:

- Sunghee Lee, M.S., UNM, June 2005. Thesis: *Approximate Bottom Line DEE (Dead End Elimination): Hybrid Bottom Line DEE and Split DEE*, (Bernard M. E. Moret advisor)
- Nicholas D. Pattengale, M. S., UNM, April 2005. Thesis: *Tools for Phylogenetic Post Processing*, (Bernard M. E. Moret advisor)
- Zhengdeng Lei, Ph.D., UIC, expected graduation 2007. Thesis: *Genome-wide Computational Prediction of Protein Localization*, (Yang Dai advisor)
- Peng Fan, Ph.D., UIC, expected graduation 2007. Thesis: *Design and Analysis of Clustering Frameworks in Vehicular Ad-hoc Networks*, (Peter Nelson advisor)
- Waseem Ahmad, Ph.D., UIC, expected graduation 2007. Thesis: *TRIUMF: A context-aware trusted Middleware for Secure and Reliable Collaborative Computing*, (Ashfaq Khokhar advisor)

Service and Volunteer Activities:

Program Committee Member: AAAI-07 Workshop on Preference Handling for Artificial Intelligence 2007.

IEEE International Conference on Bioinformatics and Biomedicine (BIBM) 2007

Meetings and Sessions Organized and Chaired: DIMACS Workshop on Computational Analysis of Dynamic Interaction Networks, September 2007

SFI-DIMACS Workshop on The Evolution of Gene Regulatory Logic, January 2006

Session on Computational Phylogenetics, Workshop on Bioinformatics (WABI) 2004

Session on Graph Isoperimetric Problems, SIAM Conference on Discrete Mathematics, 2002

Reviewer for: US-Israel Binational Science Foundation, Workshop on Experimental Algorithms (WEA), IEEE Transactions on Information Theory, Journal of Parallel and Distributed Computing, Hawaii International Conference on System Sciences, INFORMS Journal of Computing, Journal of Discrete Algorithms, NSF panels, DIMACS series, Journal of Optimization Methods and Software (OMS), Theory of Computing Systems (TOCS), IEEE International Conference on Networking, Sensing, and Control (ICNSC), IEEE Transactions on Parallel and Distributed Systems, Journal of Agricultural, Biological and Environmental Statistics, Journal of Theoretical Biology, International Conference on Distributed Computing Systems (ICDCS), Algorithmica, Tools and Algorithms for the Construction and Analysis of Systems (TACAS), European Joint Conferences on Theory and Practice of Software (ETAPS)

Committee Service: Faculty Advisor to Women in CS, UIC, 2007-
Faculty Senate, UIC, 2007-
Colloquium Committee, UIC, 2006-2007
Undergraduate Committee, UIC, 2005-2007
Graduate Study Committee, UIUC, 1999-2000
Fellowships, Awards, and Admissions Committee, UIUC, 1998-1999

Community Service: Faculty Mentor, Grace Hopper Celebration student team, UIC, 2006
Co-founder and president, Women in Computer Science Organization, UIUC, 2000-2001
Organizer of the Advanced Topics in Analysis of Algorithms Computer Science seminar, UIUC, 1997-1999
Mentor in the Women in Engineering Mentoring Program, UIUC, 1999-2000
Instructor for the Camp 2000 Science and Engineering Girls Summer Camp, 1998-2001