

I. ROBERT M. HANSON

Professor of Chemistry
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II. Education

B.S. California Institute of Technology, 1979
Ph.D. Columbia University, 1984 (Gilbert Stork)
Thesis: *Studies Directed Toward the Total Synthesis of the Steroidal Alkaloid Germine*

III. Postgraduate Employment and Appointments

6/14–5/16 Chair, Department of Chemistry, St. Olaf College
6/12–5/13 Chair, Department of Chemistry, St. Olaf College
2/03– St. Olaf College, Professor of Chemistry
5/92–2/03 St. Olaf College, Associate Professor of Chemistry
9/86–5/92 St. Olaf College, Assistant Professor of Chemistry
9/85– Integrated Graphics, Sole Proprietor
1/84–8/86 Massachusetts Institute of Technology, Postdoctoral Fellow (K. Barry Sharpless)
6/80–8/80 Health-Chem Corporation, Chemist
3/79–6/79 California Institute of Technology, Technician

IV. Courses Taught

St. Olaf College: Chemistry 110, 121, 123, 125, 126, 247, 248, 253, 254, 260, 280, 380, 388, 390, 398, Chemistry/Biology 126

V. Professional Activity

Professional affiliations

American Chemical Society
American Physical Society
International Society for Computational Biology
International Union of Pure and Applied Chemistry

Publications (in reverse chronological order)

1. Gilbert Stork, Ayako Yamashita, Robert M. Hanson, Ly Phan, Eifion Phillips, Daniel Dubé, Pieter H. Bos, Andrew J. Clark, Maxwell Gough, Mark L. Greenlee, Yimin Jiang, Keith Jones, Masato Kitamura, John Leonard, Tongzhu Liu, Philip J. Parsons, and Aranapakam M. Venkatesan, "Synthetic Study toward Total Synthesis of (\pm)-Germine: Synthesis of (\pm)-4-Methylenegermine", *Org. Lett.*, **2017**, *19*, pp. 5150–5153
2. Robert M. Hanson and Xiang-Jun Lu, "DSSR-Enhanced Visualization of Nucleic Acid

- Structures in Jmol” *Nucleic Acids Research*, **2017** (<https://academic.oup.com/nar/article-lookup/doi/10.1093/nar/gkx365>)
3. Angel Herráez and Robert M. Hanson, “Jmol para enseñar y aprender química” *Educació Química: EduQ*, **2017**, 22, pp. 13-21.
 4. Michael J. Mehl, David Hicks, Comac Toher, Ohad Levy, Robert M. Hanson, Gus Hart, Stefano Curtarolo “The AFLOW Database of Crystallographic Prototypes” *Computational Materials Science*, **2017** (978 pp) 10.1016/j.commatsci.2017.01.017.
 5. R. M. Hanson, “Jmol/JSmol Molecular Visualization Application, Version 14.9” <https://sourceforge.net/projects/jmol/files/Jmol/>, Feb. 2, 2017.
 6. Samuel V. Gallego, J. Manuel Perez-Mato, Luis Elcoro, Emre Tasci, Robert M. Hanson, Mois I. Aroyo and Gotzon Madariaga, “MAGNDATA: Towards a database of magnetic structures. II. The incommensurate case” *J. Appl. Cryst.* **2016**, 49, pp 1941-1956.
 7. S. V. Gallego, J. M. Perez-Mato, L. Elcoro, E. S. Tasci, R. M. Hanson, K. Momma, M. I. Aroyo and G. Madariaga, “MAGNDATA: towards a database of magnetic structures. I. The commensurate case” *J. Appl. Cryst.* **2016**, 49, pp 1750-1776, <https://jcheminf.springeropen.com/articles/10.1186/s13321-016-0160-4>
 8. Robert M. Hanson, “Jmol SMILES and Jmol SMARTS: specifications and applications” *Journal of Cheminformatics* **2016** 8:50 DOI: 10.1186/s13321-016-0160-4, <https://doi.org/10.1107/S1600576716012863>.
 9. Vincent F. Scalfani, Antony J. Williams, Valery Tkachenko, Karen Karapetyan, Alexey Pshenichnov, Robert M. Hanson, Jahred M. Liddie, and Jason E. Bara, “Programmatic conversion of crystal structures into 3D printable files using Jmol” *Journal of Cheminformatics* **2016** 8:66 DOI: 10.1186/s13321-016-0181-z, <https://dx.doi.org/10.1186/s13321-016-0181-z>.
 10. Simone Sturniolo, Timothy F.G. Green, Robert M. Hanson, Miri Zilka, Keith Refson, Paul Hodgkinson, Steven P. Brown, Jonathan R. Yates, “Visualization and processing of computed solid-state NMR parameters: MagresView and MagresPython,” *Solid State Nuclear Magnetic Resonance*, **2016**, 78, pp 64-70, <http://dx.doi.org/10.1016/j.ssnmr.2016.05.004>.
 11. R. M. Hanson, “Jmol/JSmol Molecular Visualization Application, Version 14.8” <https://sourceforge.net/projects/jmol/files/Jmol/>, Dec. 17, 2016.
 12. R. M. Hanson, “Jmol/JSmol Molecular Visualization Application, Version 14.6” <https://sourceforge.net/projects/jmol/files/Jmol/>, Jun. 30, 2016.
 13. R. M. Hanson, “Jmol/JSmol Molecular Visualization Application, Version 14.4” <https://sourceforge.net/projects/jmol/files/Jmol/>, Dec. 13, 2015.
 14. R. M. Hanson, “Jmol/JSmol Molecular Visualization Application, Version 14.2” <https://sourceforge.net/projects/jmol/files/Jmol/>, Jun. 13, 2014.
 15. Bob Hanson, “Molecular Visualization for the Masses - PDB Goes to Disneyland” PDB Newsletter, Fall 2014, No. 63. http://www.rcsb.org/pdb/general_information/news_publications/newsletters/2014q4/corner.html
 16. Antony N. Davies, Mohan Cashyap, Robert Lancashire, Robert M. Hanson, “A head in the clouds?—Part two: exploring distributed, multi-server 1H NMR prediction” *Spectroscopy Europe* **2014**, <http://www.spectroscopyeurope.com/columns/tony-davies-column/3382-a-head-in-the-cloudspart-two-exploring-distributed-multi-server-1h-nmr>

- [prediction](#).
17. R. M. Hanson, "Jmol/JSmol Molecular Visualization Application, Version 14.0" <https://sourceforge.net/projects/jmol/files/Jmol/>, Dec. 4, 2013.
 18. R. M. Hanson, J. Prilusky, Z. Renjian, T. Nakane, and J. L. Sussman, "JSmol and the Next-Generation Web-Based Representation of 3D Molecular Structure as Applied to Proteopedia" *Israel J. Chem.* **2013**, 53, 207-216.
 19. R. M. Hanson, "Jmol/JSmol Molecular Visualization Application, Version 13.2" <https://sourceforge.net/projects/jmol/files/Jmol/>, Jul. 18, 2013.
 20. S. P. Tully, T. M. Stitt, R. D. Caldwell, B. J. Hardock, R. M. Hanson, and P. Maslak, "Interactive Web-Based Pointillist Visualization of Hydrogenic Orbitals Using Jmol" *J. Chem. Educ.* **2013**, 90, pp 129–131. <http://dx.doi.org/10.1021/ed300393s>
 21. R. M. Hanson, "A Unified Graphical Representation of Chemical Thermodynamics and Equilibrium," *J. Chem. Educ.*, **2012**, 89, 1526–1529.
 22. R. M. Hanson, "Jmol Molecular Visualization Applet, Version 13.0," <http://jmol.sourceforge.net>, Aug. 22, 2012.
 23. R. M. Hanson, "Jmol Molecular Visualization Applet, Version 12.2," <http://jmol.sourceforge.net>, Oct. 3, 2011
 24. N.M. O'Boyle, R.Guha, E.L. Willighagen, S.E. Adams, J. Alvarsson, J.-C. Bradley, I.V. Filippov, R.M. Hanson, M.D. Hanwel, G.R. Hutchison, C.A. James, N. Jeliaskova, A. Lang, K.M. Langner, D.C. Lonie, D.M. Lowe, J. Pansanel, D. Pavlov, O. Spjuth, C. Steinbeck, A.L. Tenderholt, K.J. Theisen, and P. Murray-Rust "Open Data, Open Source and Open Standards in chemistry: The Blue Obelisk five years on" *Journal of Cheminformatics* **2011**, 3:37
 25. R.M. Hanson, D. Kohler, S.G. Braun, "Quaternion-based definition of protein secondary structure straightness and its relationship to Ramachandran angles", *PROTEINS* **2011**, 79, 2172-2180.
 26. P. Canepa, R.M. Hanson, P. Ugliengo, M. Alfredsson, "J-ICE: a new Jmol interface for handling and visualizing Crystallographic and Electronics properties", *J. Appl. Cryst.* **2011**, 44, 225-229.
 27. S. Unni, Y. Huang, R. M. Hanson, M. Tobias, S. Krishnan; W. Li; J. E. Nielsen, N. A. Baker, "Web servers and services for electrostatics calculations with APBS and PDB2PQR", *J. Comp. Chem.* **2011**, 32, 1488-1491.
 28. R. M. Hanson, "Jmol -- A Paradigm Shift in Crystallographic Visualization," *J. Appl. Cryst.* **2010**, 43, 1250-1260
 29. R. M. Hanson, "Jmol Molecular Visualization Applet, Version 12.0," <http://jmol.sourceforge.net>, July 28, 2010
 30. R. M. Hanson, "Jmol Molecular Visualization Applet, Version 11.8," <http://jmol.sourceforge.net>, Aug. 25, 2009
 31. A. Herraiez, R. M. Hanson, L.Glasser, "Interactive 3D Phase Diagrams Using Jmol," *J. Chem. Educ.* **2009**, 86, 566
 32. R. M. Hanson, "Jmol Molecular Visualization Applet, Version 11.6," <http://jmol.sourceforge.net>, Oct. 1, 2008
 33. R. M. Hanson, P. Riley, J. Schweinfus, P. J. Fischer, "Using Graphs of Gibbs Energy versus Temperature in General Chemistry Discussions of Phase Changes and Colligative Properties" *J. Chem. Educ.* **2008**, 85, 1142.
 34. M. A. Klingshirn, A. F. Wyatt, R. M. Hanson, G. O. Spessard, "Determination of the

- Formula of a Hydrate: A Greener Alternative” *J. Chem. Educ.* **2008**, *85*, 819.
35. B. McMahon and R. M. Hanson, “A toolkit for publishing enhanced figures” *J. Appl. Cryst.* **2008**, *41*, 811-814 [doi:10.1107/S0021889808015616]
36. R. M. Hanson and S. E. Green, *Introduction to Molecular Thermodynamics* (University Science Books, Sausalito, CA, **2008**, 296 pp.)
37. R. M. Hanson, “24/7 dynamic NMR spectroscopy : A new paradigm for undergraduate NMR use” in *Modern Nuclear Magnetic Resonance in Undergraduate Education*, D. Rovnyak, Ed., ACS Symposium Series No. 969, **2007**, pp 62-76.
38. R. M. Hanson, “Jmol Molecular Visualization Applet, Version 11.4,” <http://jmol.sourceforge.net>, Dec. 30, 2007
39. R. M. Hanson, “Jmol Molecular Visualization Applet, Version 11.2,” <http://jmol.sourceforge.net>, Aug. 10, 2007
40. R. M. Hanson, “Jmol Molecular Visualization Applet, Version 11.0,” <http://jmol.sourceforge.net>, Mar 3, 2007
41. R. M. Hanson, B. Michalek, “Give Them Money: The Boltzmann Game, a Classroom or Laboratory Activity Modeling Entropy Changes and the Distribution of Energy in Chemical Systems” *J. Chem. Educ.* **2006**, *83*, 581.
42. R. M. Hanson and I. M. Hanson, "Elementary Bingo" *J. Chem. Educ. WebWare* **2004**.
43. R. M. Hanson, “Playing-Card Equilibrium” *J. Chem. Educ.* **2003**, *80*, 1271.
44. R. M. Hanson, “Orbital” *J. Chem. Educ.* **2003**, *80*, 109.
45. R. M. Hanson, “The Organic ChemIST” website (Prentice Hall, 2003).
46. R. M. Hanson, “Chemical Name Game” *J. Chem. Educ.* **2002**, *79*, 1380.
47. R. M. Hanson, “What’s in a Name?” *J. Chem. Educ. Webware* **2002**, *79*, 1380.
48. R. M. Hanson, “Principal Species and pH in Acid/Base Solution” *J. Chem. Educ.* **2002**, *79*, 1379.
49. R. M. Hanson, “Mechanism-Based Kinetics Simulator” *J. Chem. Educ.* **2002**, *79*, 1379.
50. R. M. Hanson, “Huckel Determinant Solver” *J. Chem. Educ. Webware* **2002**, *79*, 1379.
51. R. M. Hanson, *Epoxide Migration (Payne Rearrangement) and Related Reactions*, in *Organic Reactions, Vol. 60*, Larry E. Overman, *et al.*, Ed., pp 1–156 (Wiley, **2002**).
52. R. M. Hanson, *Written Quatntitative Exam Questions*, in *The Hidden Curriculum, Part 1* S. Tobias, J. Raphael, Eds., (Plenum, NY) **1997**, 96-97.
53. B. Cipra, R. M. Hanson, A. Kolan, “Periodic Trajectories in Right-Triangle Billiards” *Physical Review E*, **1995**, *52*, 2066.
54. R. M. Hanson, *Molecular Origami: Precision Scale Models from Paper* (University Science Books, **1995**).
55. R. M. Hanson, S. A. Bergman, “Data-Driven Chemistry: Making Molecular Models (Literally) from Electron Diffraction Data” *J. Chem. Educ.* **1994**, 150.
56. G. L. Hardgrove, J. S. Clark, A. Q. Thieu, R. M. Hanson, “Structure of (S,S)-(E)-3-(2-butenoyl)-2,4-bis(phenylmethyl)oxazolidine” *Acta Cryst. C49* **1993**, 336.
57. R. M. Hanson, “The Synthetic Methodology of Nonracemic Glycidol and Related 2,3-Epoxy Alcohols” *Chemical Reviews* **1991**, 437–475.
58. Yun Gao, R. M. Hanson, Janice M. Klunder, Soo Y.Ko, Hiroko Masamune, and K. Barry Sharpless, “Catalytic Asymmetric Epoxidation and Kinetic Resolution: Modified Procedures Including in Situ Derivatization” *J. Amer. Chem. Soc.* **1987**, *109*, 5765.
59. R. M. Hanson, “FLATLAND and the Threefold Challenge of Text and Chemical Graphics Integration” in *Graphics for Chemical Structures*, W. Warr, Ed.; ACS

- Symposium Series #341; American Chemical Society: Washington, D.C., **1987**.
60. R. M. Hanson, S.Y. Ko, and K. B. Sharpless, "Catalytic Asymmetric Epoxidation" *U.S. Patent* 4,900,847.
 61. R. M. Hanson and K.B. Sharpless, "Catalytic Asymmetric Epoxidation" *J. Org. Chem.* **1986**, *51*, 1922.
 62. R. M. Hanson, "Absolute Stereochemistry of the Triol Moiety of Gymnoprenols: A Reinvestigation" *Tetrahedron Lett.* **1984**, *25*, 3783–6.
 63. R. M. Hanson, "Studies Directed Toward the Total Synthesis of the Steroidal Alkaloid Germine" Ph.D. Thesis, Columbia Univ., 1983. (not included collection)

Conference/Symposium Organizing Activities (in reverse chronological order)

1. Symposium presider, Gordon Research Conference on Visualization in Science and Education, Bates College, Aug. 2-7, 2015.
2. Symposium co-organizer, "Web-Based Resources for Chemical Education: Online Resources," 22nd Biennial Conference on Chemical Education, Penn State Univ., 2012
3. Symposium co-organizer, "Web-Based Applications for Chemical Education," 21st Biennial Conference on Chemical Education, University of North Texas, 2010
4. Symposium co-organizer, "Web-Based Applications for Chemical Education," 20th Biennial Conference on Chemical Education, Indiana University, 2008
5. Symposium co-organizer, "Web-Based Applications for Chemical Education," 19th Biennial Conference on Chemical Education, Purdue University, 2006
6. Conference co-organizer, ACS CONFCHEM on-line conference, "Web-Based Applications for Chemical Education: Experiences and Visions," May 12 – May 18, 2006
7. Symposium organizer/presider, "Automation and Remote Access Technology in the Undergraduate Teaching Laboratory", American Chemical Society 229th National Meeting, San Diego, CA, 2005

Professional presentations (in reverse chronological order)

1. "SwingJS: Giving Java applets new life as JavaScript equivalents - applications to Education and Science," Udo Borkowski, Robert Hanson, Renjian Zhou, **Tahir Ahsan**, **Andrew Raduege**, **Nikesh Yadav**, **Nadia El Mouldi**, **Andrew Lee**, 20th Workshop on Software-Reengineering & Evolution (WSRE 2018), Bad-Honnef, Germany, May 4, 2018.
2. "What's new in Jmol for Proteopedia," Robert M. Hanson, Proteopedia 10th Anniversary Conference, U Mass Amherst, Jan 22, 2018.
3. "The AFLOW Fleet for Materials Discovery," Cormac Toher, Corey Oses, David Hicks, Eric Gossett, Frisco Rose, Pinku Nath, Demet Usanmaz, Denise C. Ford, Eric Perim, Camilo E. Calderon, Jose J. Plata, Yoav Lederer, Michal Jahnátek, Wahyu Setyawan, Shidong Wang, Junkai Xue, Kevin Rasch, Roman V. Chepulsii, Richard H. Taylor, Geena Gomez, Harvey Shi, Andrew R. Supka, Rabih Al Rahal Al Orabi, Priya Gopal, Frank T. Cerasoli, Laalitha Liyanage, Haihang Wang, Ilaria Siloi, Luis A. Agapito, Chandramouli Nyshadham, Gus L. W Hart, Jesús Carrete, Fleur Legrain, Natalio Mingo, Eva Zurek, Olexandr Isayev, Alexander Tropsha, Stefano Sanvito, Robert M.

Hanson, Ichiro Takeuchi, Michael J. Mehl, Aleksey N. Kolmogorov, Kesong Yang, Pino D'Amico, Arrigo Calzolari, Marcio Costa, Riccardo De Gennaro, Marco Buongiorno Nardelli, Marco Fornari, Ohad Levy, Stefano Curtarolo, arXiv:1712.00422 [cond-mat.mtrl-sci], 2017.

4. "Visualización 3D Molecular con Aplicaciones a Química Medicinal" Edwin Escalera and Robert M. Hanson, III feria nacional de ciencias y tecnología, buenas ideas 2017, Universidad Mayor de San Simón, 19 Oct 2017 (in Spanish).
5. "Interactive teaching of crystallography using Jmol" Robert M. Hanson, 24th Congress of the International Union of Crystallography, Hyderabad, India, Aug 22, 2017.
6. "CIF1 to CIF2: Lessons learned in the development of Jmol" Robert M. Hanson, 24th Congress of the International Union of Crystallography, Hyderabad, India, Aug 27, 2017.
7. "Integrative interactive visualization of crystal structure, band structure, and Brillouin zone" **Ben Hinke, Matt Van Koevering**, Robert M. Hanson, David Hicks, Jose Plata, Cormac Toher, Corey Oses, Eric Gossett, and Stefano Curtarolo, (poster) American Physical Society Meeting, Baltimore, MD, March 15, 2017.
8. "Visualización de las Reacciones Químicas en 3D" *2º Jornada Oficial de Bienvenida Orientación Estudiantil*, Facultad de Ciencias y Tecnología, Universidad Mayor de San Simón, Cochabamba, Bolivia, March 22, 2017 (in Spanish).
9. "Jmol Past, Present, and Future" 86th NII Shonan Meeting: *Web Molecular Graphics*, Kanagawa, Japan, September 3, 2016.
10. "Ciclo de Talleres (III): Uso de los recursos IMT y Kinetex en la química física" Universidad Mayor de San Simón, Cochabamba, Bolivia, June 30, 2016 (workshop, in Spanish).
11. "Ciclo de Talleres (II): Visualización interactiva de moléculas en 3D y uso de los recursos Jmol: química orgánica" Universidad Mayor de San Simón, Cochabamba, Bolivia, June 29, 2016 (workshop, in Spanish).
12. "Importancia de la visualización interactiva de moléculas" Universidad Mayor de San Simón, Cochabamba, Bolivia, June 29, 2016 (in Spanish).
13. "Ciclo de Talleres (I): Visualización interactiva de moléculas en 3D y uso de los recursos Jmol: química general-inorgánica" Universidad Mayor de San Simón, Cochabamba, Bolivia, June 28, 2016 (workshop, in Spanish).
14. "Jmol para Principiantes" Colegio Don Bosco, Cochabamba, Bolivia, Jun 22, 2016 (in Spanish).
15. "Enhancing AFLOW visualization using Jmol" **Jacob LaNasa, Brigitte Honaker, Elizabeth New, Patrik Štefek**, Robert M. Hanson, Stefano Curtarolo, (poster) American Physical Society Meeting, Baltimore, MD, March 17, 2016.
16. "Jmol: Connecting Disciplines Through Visualization" (poster) Gordon Research Conference on Visualization in Science & Education, Bates College, Aug 2-7, 2015.
17. "Cloud-Based Visualization of Value-Added Model Annotations Using Jmol", University of Dundee, Dundee, Scotland, July 20, 2015.
18. "Cloud-Based Visualization of Value-Added Model Annotations Using Jmol" (poster) 16th International Conference on Structural Biology, Dublin, Ireland, July 10-14, 2015.
19. "Jmol en educación química", Facultad de Bioquímica y Farmacia, Universidad Mayor de San Simón, Cochabamba, Bolivia (in Spanish, June 25, 2015)
20. "Real-time classroom comparison of structures and NMR spectra using Jmol/JSpecView and nmrdB" R. M. Hanson, R. Lancashire, and L. Patiny, 249th ACS

- National Meeting, Denver, Colorado, March 22, 2015.
21. "JCAMP-MOL: A JCAMP-DX extension to allow interactive model/spectrum exploration using Jmol and JSpecView" R. M. Hanson and R. Lancashire, 249th ACS National Meeting, Denver, Colorado, March 25, 2015.
 22. "Innovative Molecular Visualization in Biochemistry and Pharmacology: Using Surfaces to Depict Contacts and Interactions," Universidad de Alcalá, Alcalá de Henares, Spain, May 22, 2014.
 23. "Accessing 3D printable chemical structures online" Vincent F. Scalfani, Antony J. Williams, Robert M. Hanson, Jason E. Bara, Aileen Day, Valery Tkachenko, 248th National Meeting of the American Chemical Society, San Francisco, August 10-14, 2014.
 24. "Molecular Visualization in the Age of International Connectivity," Universidad de Alcalá, Alcalá de Henares, Spain, May 21, 2014.
 25. "Molecular Visualization in the Age of International Connectivity," Universidad de País Vasco, Leioa, Spain, May 15, 2014.
 26. "Introduction to Jmol for the Solid State," Departamento de Física de la Materia Condensada, Universidad de País Vasco, Leioa, Spain, May 8, 2014.
 27. "Molecular Visualization in the Age of International Connectivity," University of the West Indies, Mona, Kingston, Jamaica, January 23, 2014.
 28. "Jmol/JSmol," Scripps Research Institute, La Jolla, Ca., Nov. 12, 2013.
 29. "Jmol/JSmol," Workshop on Theoretical Model Archiving, Validation, and PDBx/mmCIF Data Exchange Format, Rutgers University-Piscataway, N.J., Oct. 22, 2013.
 30. "JCAMP-MOL: A JCAMP-DX extension to allow interactive model/spectrum exploration using Jmol and JSpecView," Robert M. Hanson and Robert Lancashire, 246th ACS National Meeting, Indianapolis, Indiana, Sept. 11, 2013.
 31. "JSmol: Full-service molecular visualization on the Web without Java," Robert Hanson, Zhou Renjian, Takanori Nakane, Paul Pillot, 246th ACS National Meeting, Indianapolis, Indiana, Sep. 8, 2013.
 32. "Exploring Crystal Structure, Symmetry, and Energetics with Jmol," Crystal Workshop MSSC2013, l'Università di Torino, Turin, Italy, Sept. 2, 2013.
 33. "Integration of Spectroscopy with Molecular Structure: Recent Advances and Future Plans," Workshop in Cheminformatics, École Polytechnique Fédérale de Lausanne, Switzerland, Aug. 30, 2013.
 34. "JSmol: Full-Service Molecular Visualization On the Web Without Java," Robert M. Hanson, Zhou Renjian, Gordon Research Conference on Visualization In Science & Education, Bryant University, July 21-26, 2013.
 35. "Visualization of periodic crystalline structure and wave functions using Jmol," The University of Warwick, Coventry, UK, July 3, 2013.
 36. "Visualization of periodic crystalline structure and wave functions using Jmol," Rutherford-Appleton Laboratories, Chilton, Oxfordshire, UK, June 26, 2013.
 37. "Novel Surface Visualizations in Macromolecular, Crystalline, and Solid-State Systems, Hebrew University in Jerusalem, Israel, Jan. 30, 2013.
 38. "Novel Surface Visualizations in Macromolecular, Crystalline, and Solid-State Systems, Weizmann Institute of Science, Rehovot, Israel, Jan. 27, 2013.
 39. "Making the connection between molecular structure and spectroscopy: Jmol, JSpecView, and JCAMP-MOL," R. M. Hanson, R. J. Lancashire, and A. Leone, 244th

- National Meeting of the American Chemical Society, Philadelphia, Pennsylvania, Aug. 21, 2012.
40. "Making the connection between green chemistry and safety at the undergraduate level," R. M. Hanson, 244th National Meeting of the American Chemical Society, Philadelphia, Pennsylvania, Aug. 21, 2012.
 41. "Molecular visualization for the masses: Virtual model kits to virtual playgrounds," R. M. Hanson, E. Wyatt, and H. Nguyen, 22nd Biennial Conference on Chemical Education, Penn. State University, State College, Pennsylvania, Aug. 1, 2012.
 42. "Molecular visualization for the masses: Virtual model kits to virtual playgrounds," R. M. Hanson, St. Olaf Alumni College, June 1, 2012.
 43. "Visualization of periodic crystalline structure and wave functions using Jmol", R. M. Hanson, CCP-NC Visualization Planning Meeting, Department of Materials, University of Oxford, Oxford, UK, May 24, 2012.
 44. "Molecular visualization for the masses: Virtual model kits to virtual playgrounds," R. M. Hanson, Department of Chemistry, St. Olaf College, Dec. 8, 2011.
 45. "Jmol virtual model kit: An entirely new way to build and explore molecular structures," R. M. Hanson, Lexington Section, American Chemical Society, Centre College, Danville, Kentucky, Oct. 17, 2011.
 46. "Exploring Crystal Structure, Symmetry, and Energetics with Jmol," R. M. Hanson, Crystal Workshop MSSC2011, University of Turin, Italy, Sept. 5, 2011.
 47. "Interactive Visualization of Intermolecular Contacts" (poster), R. M. Hanson and E. Wyatt, Gordon Research Conference on Visualization in Science and Education, Bryant University, July 10-15, 2011.
 48. "Cyber-Enabled 24/7 NMR Spectroscopy: Transforming Organic Chemistry," R. M. Hanson, NMR in Biochemistry Workshop, University of Iowa, Iowa City, June 11, 2011.
 49. "Jmol in the Classroom: Molecule of the Moment," R. M. Hanson, South University School of Pharmacy, Savannah, Georgia, May 26, 2011.
 50. "Jmol virtual model kit: An entirely new way to build and explore molecular structures," R.M. Hanson, O. Rothenberger, T. Newton, 241st ACS National Meeting, Anaheim, California, March 28, 2011.
 51. "Green chemistry education: Sources of student conceptions of green chemistry" Epp, Erik M. Epp, Kallie B. Doeden, and Robert M. Hanson, 241st ACS National Meeting, Anaheim, California, March 2011.
 52. "Jmol – Portal Into the Molecular World," R. M. Hanson, International Council for Scientific and Technical Information 2011 Workshop "Multimedia and Visualizations for Science" Microsoft Research, Redmond, Washington, Feb. 8, 2011.
 53. "Advanced Jmol Workshop," R. M. Hanson and A. Herraes, 21st Biennial Conference on Chemical Education, University of North Texas, Denton, Aug. 2, 2010.
 54. "Integrated Chemistry and Biology: A Three-Course Sequence of First-Year Science Students," R. J. Abdella, R. M. Hanson, P. T. Jackson, K. A. Kandl, G. Miessler, J. J. Schweinefus, M. Walczak, American Chemical Society 231st National Meeting, Washington, D.C., Aug. 20, 2009.
 55. "Using Quaternions to Visualize the Secondary Structure of Proteins and Nucleic Acids," R. M. Hanson and E. F. Wyatt, Gordon Research Conference on Visualization in Science and Education, University of Oxford, Oxford, UK, July 28, 2009.
 56. "Getting the Most Out of Jmol Protein Explorer," R. M. Hanson, American Chemical

- Society 230th National Meeting, Mar. 22, 2009.
57. "Making Connections Through Visualization," R. M. Hanson, University of Missouri, St. Louis, Aug. 25, 2008.
 58. "CoolMolecules: Teaching Molecular Structure with the Cambridge Structural Database," R. M. Hanson, M. Casavant, M. McGuan, and S. Wherland, 20th Biennial Conference on Chemical Education, Indiana University, July 30, 2008.
 59. "Teaching Substitution and Elimination with Real-Life Examples" R. M. Hanson, 20th Biennial Conference on Chemical Education, Indiana University, July 29, 2008.
 60. "What's New for Jmol," R. M. Hanson, 20th Biennial Conference on Chemical Education, Indiana University, July 28, 2008.
 61. "Green Chemistry Across the Curriculum At St. Olaf College," R. M. Hanson, 20th Biennial Conference on Chemical Education, Indiana University, July 31, 2008.
 62. "Green Chemistry At the Undergraduate Level," Invited Panel: Green Chemistry in Minnesota: Opportunities and Challenges for Leadership, University of Minnesota Humphrey Institute of Public Affairs, May 28, 2008.
 63. "Adventures in Thermodynamics," Bob Hanson, St. Olaf Sabbatical Series, April 8, 2008.
 64. "The Jmol Voxel (JVXL) File Format: Efficient Delivery of Isosurfaces Over the Web" (poster), R. Hanson, Gordon Research Conference on Visualization in Science and Education, Bryant University, July 1-6, 2007.
 65. "The Challenge of Web-Based Molecular Visualization," Robert M. Hanson, invited presentation, University of Cologne, Nijmegen University, Cambridge University, Aug. 21-25, 2006.
 66. "Using the web-based Green Chemistry Assistant to enhance understanding of chemical reactions and processes", Robert M. Hanson, 19th Biennial Conference on Chemical Education, Purdue University, Aug. 3, 2006.
 67. "AJAX /JSON Click-JavaScript -- A New Vision for Web-Based Chemistry Applications", Robert M. Hanson, 19th Biennial Conference on Chemical Education, Purdue University, Aug. 1, 2006
 68. "Jmol: Open-source molecular visualization and analysis," Robert M. Hanson, Egon Willighagen, Nicolas Vervelle, Timothy Driscoll, and Miguel Howard, ACS CONFICHEM on-line conference, "Web-Based Applications for Chemical Education: Experiences and Visions," May 12 – May 18, 2006
 69. "The Green Chemistry Assistant: a new concept in web applications," ACS CONFICHEM on-line conference, "Web-Based Applications for Chemical Education: Experiences and Visions," May 12 – May 18, 2006
 70. "The Green Chemistry Assistant: Expanding the horizons of green chemistry in chemical education," Robert M. Hanson, Paul R. Campbell, Gary O. Spessard, and Marc A. Klingshirn, American Chemical Society 231st ACS National Meeting, Atlanta, GA, March 26-30, 2006
 71. "Bringing green chemistry to the first-year chemistry curriculum," Marc A. Klingshirn, Allison F. Christensen, Robert M. Hanson, and Gary O. Spessard, American Chemical Society 231st ACS National Meeting, Atlanta, GA, March 26-30, 2006
 72. "Demystifying Green Chemistry" Robert M. Hanson, invited presentation, Department of Chemistry, Michigan State University, East Lansing, MI, Aug. 10, 2005
 73. "24/7 Remote Access to NMR: A Paradigm Shift in the Undergraduate Organic Laboratory," 88th Canadian Chemistry Conference, Saskatoon, Saskatchewan, May 31,

2005

74. "Web-Based Interface Allowing 24-Hour Undergraduate Access to a 400-MHz NMR Spectrometer," Bruker BioSpin Midwest Regional Meeting, 2004
75. "CoolMolecules: A Web-Accessible Database of Experimentally Determined Molecular Structures," American Chemical Society 228th National Meeting, Philadelphia, PA, 2004
76. "Accessible Quantum Statistical Approach to Molecular Thermodynamics for First-Year College Chemistry Students," 18th Biennial Conference on Chemical Education, Ames, Iowa, 2004
77. "Web-Based Interface Allowing 24-Hour Undergraduate Access to a 400-MHz NMR Spectrometer.," 18th Biennial Conference on Chemical Education, Ames, Iowa, 2004
78. "Kinetics Explorer: An Interactive Web-Based Resource for Teaching Kinetics at the First-Year College Level.," 18th Biennial Conference on Chemical Education, Ames, Iowa, 2004
79. "Four Web-Based Methods for Delivering Dynamic Interactive Material for Teaching Thermodynamics and Kinetics at the First-Year College Level," 18th Biennial Conference on Chemical Education, Ames, Iowa, 2004
80. "24/7 Dynamic OleNMR: A New Paradigm for the Undergraduate Laboratory," American Chemical Society 227th National Meeting, Anaheim, CA, 2004
81. "A Modified Bruker Avance 400 MHz NMR Spectrometer Allowing 24/7 Web-Based Access by Undergraduates to Spectrometer Control and Data Analysis," 44th Experimental NMR Conference, Savannah, GA, 2003
82. "Two Novel Nonmolecular Uses of Chime," 17th Biennial Conference on Chemical Education, Bellingham, WA, 2002
83. "Using Molecular Origami to Explore Structure and Bonding," American Chemical Society 221st National Meeting, San Diego, CA, 2001
84. "Department-Based Course Toolkits: More Effective than Course Home Pages?" *Learning, Teaching, and Technology Faculty Presentation Series*, St. Olaf College, 2000
85. "Interactive Study Materials via JavaScript," *Learning, Teaching, and Technology Faculty Presentation Series*, St. Olaf College, 2000
86. "Take a Chance—Bring Probability Into Your Chemistry Classroom," ChemEd '99, Sacred Heart University, Fairfield, CT, 1999
87. "Molecular Origami I: Make Your Own Precision Scale Models," ChemEd '99 (Workshop), Sacred Heart University, Fairfield, CT, 1999
88. "Molecular Origami II: Using Precision Scale Models," ChemEd '99 (Workshop), Sacred Heart University, Fairfield, CT, 1999
89. "Using Molecular Origami to Enhance Understanding of Molecular Structure and Theory," 15th Biennial Conference on Chemical Education, U. of Waterloo, Waterloo, ON, 1998
90. "Molecular Origami: A Novel Approach to Investigating Structural Relationships," Department of Chemistry, Montana State University, Bozeman, MT, 1998
91. "Using Data-Driven Chemistry to Enhance Understanding of Atomic and Molecular Structure and Theory," ChemEd '97, University of Minnesota, Minneapolis, MN, 1997
92. "Titrations and Buffers: A Successful Investigative Laboratory/Writing Project for First-Year College Chemistry Students," ChemEd '97, University of Minnesota, Minneapolis, MN, 1997
93. "Data-Driven Chemistry: Application and Evaluation," ChemEd '95, Old Dominion University, Norfolk, VA, 1995

94. "Molecular Origami: Using Precision Scale Models to Teach Structure and Bonding," ChemEd '95, Old Dominion University, Norfolk, VA, 1995
95. "Playing-Card Equilibrium," ChemEd '95, Old Dominion University, Norfolk, VA, 1995
96. "Data-Driven Chemistry: A Novel Approach to the Teaching and Learning of Atomic and Molecular Theory" (Poster), Gordon Research Conference on Innovations in the Teaching of College Chemistry, Ventura, CA, 1994
97. "Stereoselectivity in Perspective," (workshop presentation) Institute of Gas Technology, 1993
98. Participant, NSF Workshop on Research and Education, Washington, DC, 1992
99. "Stereochemical Factor Analysis: Applications for Natural Product Synthesis and Drug Development," (poster) Gordon Research Conference on Natural Products, New Hampton, NH, 1991
100. "Stereochemical Factor Analysis," Columbia University, New York, NY, 1991
101. "Pseudo-C₂-Symmetric Chiral Ligands," Department of Chemistry, Gustavus Adolphus College, St. Peter, MN, 1990
102. "The Chemistry of Color," Lecture/Demonstration, Apple Valley High School, Apple Valley, MN, 1990
103. "The Presidential Young Investigator Program: Nurturing the Next Generation of Researchers" (panel), National Meeting, American Association for the Advancement of Science, New Orleans, LA, 1990
104. "New Perspectives in Stereochemistry," Department of Chemistry, U. Virginia, Charlottesville, VA, 1990
105. "Stereochemical Factor Analysis" (poster), Council for Chemical Research, Parsippany, NJ, 1989
106. Seminar, Department of Chemistry, College of Wooster, Wooster, OH, 1988
107. Seminar, Department of Chemistry, Loyola College, Chicago, IL, 1988
108. "Reaction-Intrinsic Analysis of Stereochemistry: Kinetic Resolution and Double Diastereoselection," (poster) Gordon Research Conference on Natural Products, Newport, RI, 1988
109. "Stereochemical Factor Analysis," Department of Chemistry, U. Minnesota, Minneapolis, MN, 1987
110. "Catalytic Asymmetric Epoxidation," Department of Chemistry, Carleton College, Northfield, MN, 1987
111. "Catalytic Asymmetric Epoxidation," Department of Chemistry, Iowa State University, Ames, IA, 1987

Undergraduate Research Collaborators (alphabetically within years)

1. Lee Banett (1987)
2. Daniel Higgins (1987)
3. Laura Knoll (1987)
4. Elizabeth Newburg (1987)
5. Brian Lieske (1988)
6. Anh Thieu (1988, 1989)
7. Lori Bates (1989)
8. Jason Gilster (1989)
9. Thomas Maier (1989)
10. Rebecca Nyquist (1989)
11. Patrick Swanson (1989)
12. Michael Forseth (1990)
13. Christopher George (1990)
14. Paul Jackson (1990, 1991)
15. Thomas Rauenhorst (1990, 1991)
16. Douglas Beussman (1991)
17. Steven Higgins (1991)
18. Nathan Stehle (1991-92)
19. Sonja Swenson (1991)
20. James Baron (1992, 1993)
21. Sara Bergman (1992)
22. R. Evan Easton (1992)
23. T. André Erickson (1992)
24. Susan Green (1992)
25. Shawn Hausmann (1992)
26. Brian Raymer (1992)
27. Adam Renslo (1992)
28. Deborah Dryer (1993)
29. Lizbet Langseth (1993)
30. Leah Mattson (1993)
31. Karl Nelsen (1993)
32. Thuan Truong (1993)
33. David Bierbrauer (1994)
34. Colleen Rooney (1994)
35. Christopher Rasmussen (1994)
36. Resha Eriksmoen (1994)
37. Ryan Hardin (1994)
38. Shelly Driver (1995)
39. Adam Hoogenraad (1995)
40. Erica Kylo (1995)
41. Merideth Schrader (1995)
42. Craig Schulz (1995)
43. Ross Meyer (1996)
44. Kathryn Olsen (1996)
45. Erin Carlson (1998)
46. Nathan Falk (1998)
47. Paul Wray (1998)
48. Michael Purnell (2002)
49. Stephanie Skladzien (02)
50. Gregg Sydow (2002)
51. Bryan Anderson (2003)
52. Jared Irwin (2003)
53. Melanie Casavant (2004)
54. Michael McGuan (2004)
55. Paul Campbell (2005)
56. Allison Christensen (05)
57. Jenea Fabini (2007)
58. Daniel Kohler (07,08)
59. Ryan Vink (2007)
60. Benjamin Thompson (08)
61. Sean Johnston (2009)
62. Steven Braun (2009,10)
63. Kallie Doeden (2010)
64. Evan Anderson (2011)
65. Hai Nguyen (2011)*
66. Sasha Schrandt (2011)
67. Erik Wyatt (2011)
68. Amanda Leone (2012)
69. Kellan Passow (2012)
70. Brigette Honaker (2015)
71. Patrick Stefak (2015)
72. Elizabeth New (2015)
73. Jacob LaNasa (2015)
74. Ben Hinke (2016,2018)
75. Nadia el Mouldi (2016)
76. Matt van Koevering(2016)
77. Andreas Raduege (2016)
78. My Nguyen (2017)
79. Jacob Packard (2017)
80. Minghzi Zhao (2017)
81. Andrew Lee (2017)
82. Tahir Ahsan (2017)
83. Nikesh Yadav (2017)
84. Sophia Musacchio (2017)

**Carleton College student*

Postdoctoral Research Collaborators

1. Eric Epp (2010)

Honors, appointments, awards, grants (in reverse chronological order)

1. US Department of State Fulbright Specialist Grant FSP P001203, *3D Molecular Visualization for Chemistry* (Aug 2017, Oct 2017; University of San Simón, Cochabamba, Bolivia), \$5800 + airfare
2. US Office of Naval Research Broad Agency Announcement *Enhancing AFLOW Visualization Using Jmol II*, \$80,000 subcontract (Duke University) 2016-2017
3. US Office of Naval Research Broad Agency Announcement *Enhancing AFLOW Visualization Using Jmol*, \$80,000 subcontract (Duke University) 2015-2016
4. St. Olaf College sabbatical leave, 2013-2014
5. Fulbright Specialist Program Roster Candidate 2013-2019
6. Jean Dreyfus Boissevain Lectureship for Undergraduate Institutions, 2013, \$18,500
7. Chair, Department of Chemistry, 2012-2016 (on leave, 2013-14)
8. Edolph A. Larson and Truman E. Anderson, Sr., Chair of Chemistry, 2012-present (\$25,000 discretionary funds)
9. St. Olaf College Opening Convocation Faculty Speaker, 2013
10. St. Olaf College Magnus the Good Student/Faculty Collaboration Grant, 2008
11. St. Olaf College sabbatical leave, 2006–2007
12. St. Olaf College International Studies Faculty Development Grant, *Development of the January Interim course, Chemistry 260, Medicinal Chemistry in Jamaica: An International Perspective*, 2005
13. W. M. Keck Foundation, *Green Chemistry Throughout the Curriculum*, 2004-2010, \$500,000
14. St. Olaf Capital Equipment Project: *Automated 24/7 High-Field NMR Spectrometer*, 2002-2003, \$450,000
15. St. Olaf College sabbatical leave, 1999–2000
16. St. Olaf College sabbatical leave, 1992–1993
17. Eli Lilly Co., unrestricted research support, 1992, \$5,000
18. Aldrich Chemical Co., CD-ROM software, 1991, \$875
19. Eli Lilly equipment donation, 1991, \$7560
20. Varian Associates NMR Maintenance Course Tuition Reduction, 1991, \$1500
21. St. Olaf College Pretenure Release Grant (2/3 release), fall 1990
22. ARCO Chemical Co. unrestricted research support, 1990, \$4,000
23. DuPont equipment donation, 1990, \$34,000
24. American Chemical Society Petroleum Research Fund Type B Grant, 1990–92, \$18,000
25. National Science Foundation Presidential Young Investigator Award, 1989–1994, \$312,000
26. Research Corporation Cottrell Grant, 1987–1990, \$19,900
27. National Institutes of Health Research Service Award, 1984–1986
28. Hammett Research Award, Columbia University, 1983
29. National Science Foundation Predoctoral Fellowship, 1979–1982
30. Columbia University Teaching Award, 1981
31. American Institute of Chemists Honor Award, 1979
32. Arie J. Haagan-Smit Memorial Award, 1978

33. Carnation Scholarship, 1978
34. Caltech Prize Scholarship, 1977,78
35. Stauffer Scholarship, 1977

Business Activities

Sole proprietor, *Integrated Graphics*, 312 Nevad St., Northfield, Minnesota. Specializing in the design and implementation of interactive molecular graphics for education and research.

Principal Developer, *Jmol*. An open-source project dedicated to the development of interactive web-based (JavaScript) and stand-alone (Java) software for interactive molecular visualization and analysis.

Consulting and advisory boards, and contracts

1. European Bioinformatics Institute, Hinxton, UK. 2014.
2. Research Consortium for Structural Bioinformatics (RCSB), 2013.
3. University of Oxford, Department of Materials Science/Rutherford Laboratories/ Collaborative Computational Project for NMR Crystallography (CCP-NC), 2012-
4. Indigo Instruments, Waterloo, Ontario, Canada, 2011–
5. Cornell University/Epcot Theme Park, “Touch-A-Molecule” kiosk development for interactive Innoventions Building exhibit “Take a Nanooze Break”, 2010-2011
6. Contracted Content Provider, Houghton-Mifflin (high school text book content producer; "Why It Matters" video glider pilot/narrator), 2007-2008
7. Software Consultant, Dynamic Minds, Inc., Stamford, CT, 2001–02
8. Publishing Consultant, Pearson Education Co., Upper Saddle River, NJ, 2000–02
9. Exhibit Consultant, New Museum of Contemporary Art, New York, NY, 1999
10. Software Consultant, Rylaz Products, Madison, WI, 1990–1993
11. Review Panel, NSF Educational Materials Division, Washington, DC, 1991
12. Research Consultant, ARCO Chemical Co., Newtown Square, PA, 1987

Peer reviewing activities

1. Washington and Lee External Department Reviewer, 2015
2. Simpson College External Department Reviewer, 2013
3. Centre College External Department Reviewer, 2011
4. Swarthmore College External Examiner, 1990
5. Review of various NSF, PRF, and Research Corporation grant proposals in the field of research chemistry, 1987–
6. Periodic manuscript reviewer for *Journal of Cheminformatics*, *Chemical Reviews*; *Journal of Organic Chemistry*; *Organic Letters*; *Organic Preparations and Procedures, Int.*; *Journal of Chemical Education*; *University Science Books*; *McGraw-Hill*; *Prentice Hall*; *W.W. Norton*

Curricular developments—Laboratory Experiments (included in professional works collection)

1. Chemistry 121: Measurement, Observation, and Calculation (new)
2. Chemistry 121: Hazardous Material Disposal/Recovery (new)
3. Chemistry 121: Quantitative Determination of Metal Ions (new)
4. Chemistry 121: Stoichiometry: The Reaction Between Ni²⁺ and Ethylenediamine (new)
5. Chemistry 121: Introduction to Equilibrium (adapted)
6. Chemistry 121: Introduction to Acids, Bases, and pH (new)
7. Chemistry 121: pK_a of the Anthocyanin in Cranberry Juice (adapted)
8. Chemistry 121: Investigative Chemistry (new)
9. Chemistry 125: Fragrance Chemistry: Identification of Unknowns by GC/MS (new)
10. Chemistry 125: Hazardous Material Disposal/Recovery (new)
11. Chemistry 125: Quantitative Assay Development (new)
12. Chemistry 125: Investigative Chemistry (new)
13. Chemistry 126: Introduction to the Chemical Literature (new)
14. Chemistry 126: Probability and Equilibrium (new)
15. Chemistry 126: Energy Levels and Spectra—Atomic Spectroscopy (adapted)
16. Chemistry 126: Energy Levels and Spectra—Molecular Spectroscopy (new)
17. Chemistry 126: Internal Energy (adapted)
18. Chemistry 126: Probability and Entropy (new)
19. Chemistry 253/254: Tricks of the Trade (new)

VI. Service to the Community

Departmental committees and duties (only a representative portion are listed)

1. Department Chair, Chemistry, 2012-13, 2014-16
2. Associate Chair for Curriculum, 2001-04
3. Student Teacher Specialist Coordinator, 2001
4. Alumni Liaison, 2000
5. Chem Mess Editor, 1991, 2001
6. ACS Student Section Adviser, 1991
7. NMR Oversight Committee, 1989–
8. Seminar Committee, 1986, 1989, 2001

Additional departmental service: software development

1. OleNMR Web-Based Bruker 400 MHz NMR interface
2. cacheset Expands the capabilities of CAChe
3. ddeserve Web server utility allowing dynamic data exchange (server application)
4. getpic Organizes student pictures and creates a database from them
5. grades Integrated departmental grading system (server application)
6. place Allows rapid analysis of department placement exam data
7. quickurl Scripted automation of internet file transfer
8. winreg Program to allow comparison of registration data

9. chemwork Online Department Work Application
10. seminars spreadsheet-based web site seminar listing
11. survey Online Survey Analysis Tool
12. toolkit Web-Based Chemistry Course Toolkit

College committees, duties and assignments

1. Digital Scholaship Center Advisory Group (2017-)
2. Curriculum Committee (2016-18)
3. Review and Planning Committee, 2003-2005 (chair, 2004)
4. Gold Form Committee 2002 (*ad hoc*), member
5. Student Teacher Specialist Supervisor, 2001–2002 (Sean Holmes, chemistry)
6. Student Teacher Specialist Supervisor, 2001–2002 (Gabe Kortuem, physics)
7. Admissions, Retention, and Financial Aid 2001– (standing), divisional representative
8. Admissions Task Force 1997 (*ad hoc*), member
9. Curriculum and Educ. Policy 1991–95 (standing), faculty at-large representative
10. Media Board 1988–90 (standing), faculty at-large representative
11. Appeals Board 1990–92 (standing), chair for both years
12. Committee on the Status of Women 1988–89 (*ad hoc*), member
13. Women's Week Committee 1989–90 (*ad hoc*), organizer, discussion leader

Additional college-wide service: software development

1. sis2 Augmented Student Information Service web application
2. events Allows campus-wide internet-based event scheduling
3. explore Classroom scheduling utility for Registrar's Office
4. maildrop Allows quick, simple E-mail sending from campus computers
5. meetme Online coordination of multiple participant schedules (client application)
6. mysched Graphical display of weekly schedules
7. operator Allows quick look-up in on- or off-campus phone directories
8. regaudit St. Olaf College Degree Planner (client/server application set)
9. register St. Olaf College Schedule Planner (client/server application set)
10. reglist Display/Printing of registration results
11. schedule St. Olaf College Schedule Planner (PC version)

Curricular developments: software (included in professional works collection)

(1-first year, 2-organic chem., 3-other; VB-Visual Basic, JS-JavaScript)

1. bunt (1-VB) Application of the Boltzmann distribution to currency exchange
2. chmsolv (1-VB) Simplex-Based Chemical/Mathematical Equation-Solving Calculator
3. kab (1-VB) Equilibrium simulation based on a quantized energy level system
4. orbital (1-VB) Hydrogen atom orbital display using Chime
5. plotscan (1-VB) Allows x - y coordinate correlation of a digitally scanned images

6. windata (1-VB) Application to enable the collection of experimental data
7. wineq (1-VB) H₂/D₂/HD equilibration simulation
8. wintropy (1-VB) Simulation of an evenly-spaced quantized energy level system
9. acidbase (1-JS) Principal Species and pH in Acid/Base Solutions
10. animate (1-JS) Animation of a graph of K vs. T for a simple reaction system
11. banana (1-JS) Simulation of a simple 3-particle 3-unit energy system
12. boltz (1-JS) Simulation of an evenly-spaced quantized energy level system
13. graph (1-JS) JavaScript Graphing Calculator
14. h2d2 (1-JS) H₂/D₂/HD equilibration simulation
15. jscal (1-JS) JavaScript Chemical/Mathematical Equation-Solving Calculator
16. kab (1-JS) Equilibrium simulation/graphing utility (client application)
17. kinetics (1-JS) Mechanism-Based Kinetics Simulator
18. lewis (1-JS) Lewis structure practice page
19. namegame (1-JS) a chemical "Jeopardy" game covering inorganic nomenclature
20. naming (1-JS) Inorganic compound/ion naming practice page
21. quiz (1-JS) Quiz over entropy and enthalpy
22. ftir (2-VB) Demonstration of a simple infrared interferometer
23. optics (2-VB) Demonstration of linearly/circularly polarized light
24. OleNMR (2-JS/VB) Fully robotic web-based NMR spectrometer interface
25. aminoac (2-JS) Amino acid naming practice page (licensed)
26. aroname (2-JS) Aromatic compound name practice page (licensed)
27. arosel (2-JS) Aromatic compound reaction selectivity practice page (licensed)
28. arosyn (2-JS) Aromatic compound synthesis practice page (licensed)
29. cyclohex (2-JS) Animation of chair/chair interconversion of cyclohexanes (licensed)
30. data (2-JS) Reaction Finder for *Organic Chemistry, 2nd Ed.* (licensed)
31. huckel (2-JS) Simple Huckel molecular orbital theory pi-system determinant solver
32. isomers(1) (2-JS) Alkane isomer identification practice page (licensed)
33. isomers(2) (2-JS) *R, S* stereochemistry identification practice page (licensed)
34. masscalc (2-JS) Simple nominal mass/formula identifier (licensed)
35. names(1) (2-JS) Alkane Quiz I: Comparing Alkane Structures (licensed)
36. names(2) (2-JS) Alkane Quiz II: Naming Alkanes (licensed)
37. names(3) (2-JS) Draw This Structure (draws a structure from an IUPAC name)
38. pi (2-JS) Amino Acid pI Calculator (licensed)
39. showprot (2-JS) Protein Investigator (licensed)
40. callchk (3-VB) creates a database and cross-referencing code for Visual Basic
41. cdxedit (3-VB) Allows full integration of ChemDraw (CDX) files into large projects
42. chimemap (3-VB) Converts 3-D data sets to Chime-based graphs
43. ediff (3-VB) Simulates the collection and analysis of electron diffraction data
44. morphxyz (3-VB) Allows the morphing of chemical structures into a smooth sequence
45. origami (3-VB) Allows the creation of precision-scaled paper models of molecules
46. divgraph (3-JS) DIV-based graphing package for HTML applications
47. rotate (3-JS) Chime Model Rotation Calculator
48. varignu (3-JS) Web-based variable GNUplot graphing utility

Service to the wider community

1. Co-organizer and student science activities coordinator, Mano a Mano International Bolivia Rural Elementary Teachers Workshop, Arani, Bolivia, June, 2015.
2. Co-organizer and workshop leader, Mano a Mano International Bolivia Rural Elementary Teachers Workshop, Arani, Bolivia, June, 2014.
3. Principal developer and project manager, Jmol Visualization Project, 2006-present
4. Interactive user documentation developer, Jmol Visualization Project, 2005-2006
5. Violin accompanist, Northfield Retirement Center Chapel service, 2010-2015
6. Cannon Valley Regional Orchestra, Secretary for the Board of Directors (1998–2005), violin (1987–), violin section leader (1998–2005), concert master (2000, 2002), principal second (2003–)
7. Minnesota Soaring Club, Airfield Volunteer Coordinator, schedule field operations officers, instructors, and tow pilots for weekend glider operations (2001–)
8. Greenvale Park Elementary School, parent volunteer, including the weekly teaching of Challenge Math 3rd grade (1999/2000), 4th grade (2000/01), and 5th grade (2001/02), reading assistant, 1st grade (2001/02), 3rd grade “Cool Science” presenter (2000), 5th grade “Super Magnets” presenter (2001)
9. Bethel Lutheran Church Sunday School, Project Team member for 3rd–5th grade Sunday School (2000–2002)
10. Bethel Lutheran Church Justice Committee, helped organize the CROP walks of 1990 and 1991; lead various discussions relating to hunger, third-world, and other social issues (1987–1995)
11. Northfield Community Action Center, volunteer, established a service for the free repair of household appliances for the elderly and low-income families in Northfield (1987–1990), Food Shelf volunteer (1987–1990)