Paul A. Craig
Department of Chemistry
Rochester Institute of Technology
85 Lomb Memorial Drive
Rochester, NY 14623

Education

B.S. Chemistry, Oral Roberts University, Tulsa, OK, 1979, summa cum laude, National Merit Scholar.

Ph.D. Biological Chemistry, The University of Michigan, Ann Arbor, MI, 1985, National Research Service Award, 1980-1983

Postdoctoral position. Biophysical Chemistry, Henry Ford Hospital, Detroit, MI, 1985-1988, American Heart Association Fellowship, 1986 - 1988

Appointments

2013-present Head, School of Chemistry & Materials Science, RIT, Rochester, NY

2011-2012 Associate Head, Department of Chemistry, RIT, Rochester, NY

2003 - Professor of Chemistry, Rochester Institute of Technology, Rochester, NY

2001-2002 Visiting Scholar, San Diego Supercomputer Center, San Diego, CA

1999 - Assoc. Prof. of Chemistry, Rochester Institute of Technology, Rochester, NY

1993 - 1999 Asst. Prof. of Chemistry, Rochester Institute of Technology, Rochester, NY

1988 - 1993 Analytical Biochemist, BioQuant, Inc., Ann Arbor, MI

Service

Protein Data Bank Advisory Committee, 2009-present

Editorial Board, Biochemistry and Molecular Biology Education 2002 - present

Education and Professional Development Committee, American Society for Biochemistry and Molecular Biology (2002-2004)

Director, BioMoleculesAlive, the educational digital library of the ASBMB (2002 – 2005)

Professional Organizations

American Society of Biochemistry and Molecular Biology

American Chemical Society

American Crystallographic Association

American Society of Biochemistry & Molecular Biology

Project Kaleidoscope

Extramural Funding

1. NSF-REU 93-112, Physical and Chemical Properties of Macromolecules. (T. Gennett, PI), funded, $149,500, 1995 - 1997.
2. NSF-ILI DUE-9551406, Use of FT NMR in the Undergraduate Chemistry Laboratory, (Joe Hornak, PI), funded, $100,000, 24 months (1995 - 1997)
3. NSF-ILI, Project Oriented Biochemistry Laboratory in a New BS Biochemistry Degree Program, (Paul A. Craig, PI) $149,324, 24 months, 1996 - 1998.
4. General Chemistry Laboratory on the WWW using JAVA Applets, $8,000, March 1998 - July 1998, in collaboration with Jim Dix and Wayne Jones at Binghamton University.
5. American Society of Biochemistry and Molecular Biology Undergraduate Faculty Travel Award, May, 2000, $500.
6. Intelligent Systems for Molecular Biology Conference Travel Award, August, 2000, $675.
7. NSF Major Research Instrumentation Program, Equipment for gene discovery and expression analysis, NSF Major Research Instrumentation Program, (D. Lawlor, PI), $130,000. 2001-2004
8. Travel Award for Invited Speakers, American Society for Biochemistry and Molecular Biology, April, 2002, $780.
9. Travel Award for Invited Speakers, From Genes to Drugs via Crystallography, May, 2002, $1,500.
10. NSF NSDL Program, $103,000. 2002-2004
11. Travel Award for Invited Speakers, American Society for Biochemistry and Molecular Biology, April, 2003, $850.
12. Travel Award for ASBMB Education and Professional Development Committee members, April, 2003, $500.
13. NSF Research Opportunity Award, DBI-0078296 (Kim Baldridge, P.I.) $60,000. 2001-2002
14. Travel Award for Invited Speakers, American Society for Biochemistry and Molecular Biology, April, 2002, $780.
15. Travel Award for Invited Speakers, From Genes to Drugs via Crystallography, May, 2002, $1,500.
16. Travel Award for Invited Speakers, American Society for Biochemistry and Molecular Biology, June, 2004, $850.
17. Travel Award for ASBMB Education and Professional Development Committee members, June, 2004, $500.
18. Travel Award for the NSDL Reusability Conference, Orlando, FL, February, 2004, $1000.

19. American Society for Biochemistry and Molecular Biology Digital Library Award. $60,000. 2004
20. Travel Award for Invited Speakers, American Society for Biochemistry and Molecular Biology, April, 2005, $850.
21. Travel Award for ASBMB Education and Professional Development Committee members, April, 2005, $500.
22. Travel Award for the NSDL PI/PD All Projects Meeting, Chicago, IL, November 14-17, 2005, $1,000.
23. NSF ATE Award 040208, Building a Cross-Institutional Collaboratory for 3D Visualization in Technical Education and Training. (PI Jerry Fong). $85,000. 2004 – 2006
24. NIH AREA Award, NIGMS 1R15GM078077, Structural Biology Extensible Visualization Scripting Language (MPI: Herbert Bernstein (Dowling College) and Paul Craig), $107,000, 2006 – 2011
25. NIH AREA Award, NIGMS 3R15GM078077-01S, Diversity Supplement for Structural Biology Extensible Visualization Scripting Language (MPI: Herbert Bernstein (Dowling College) and Paul Craig), $53,000, 2008 – 2011
26. Merck/AAAS Undergraduate Research Scholar Program (PI Irene Evans), $60,000, 2008-2011.
27. NIH AREA Award, NIGMS 2R15GM078077-02, Algorithmic assignment of probable function to proteins of previously unknown function (MPI: Herbert Bernstein (Dowling College) and Paul Craig), $217,000 to RIT; $437,000 total, 2011-2014.
28. NIH AREA Award Supplement, NIGMS3R15GM078077-02S1, Diversity Supplement for Algorithmic assignment of probable function to proteins of previously unknown function (MPI: Herbert Bernstein (Dowling College) and Paul Craig), $107,653, 2011 – 2014.
29. NSF MSP 1050590, Boundary Crossing Teams in Support of Math and Science Excellence in Our School Systems (Sophia Maggelakis, PI) $282,211, 2011-2013.
30. NIH AREA Award Supplement, NIGMS3R15GM078077-02S2, Diversity Supplement for Algorithmic assignment of probable function to proteins of previously unknown function (MPI: Herbert Bernstein (Dowling College) and Paul Craig), $26,877, 2013 – 2014.

Intramural Funding

1. RIT Provost's Productivity Grant, Interactive Training Modules for Biochemistry, $8,968, March, 1993 through June 30, 1994.
2. COS Project Initiation Grant, Preparation of Enzyme-analyte conjugates for the immunoassay of small molecules, $5000, March, 1993 June 30, 1994
3. COS Dean's Summer Fellowship Grant, Preparation of Enzyme-analyte conjugates for the immunoassay of small molecules, $4000, summer, 1993.
4. Merck/AAAS Undergraduate Science Research Program, (PI Irene Evans), $45,000, 1994-1996.
5. Simulated Biochemistry Laboratory. Dean’s Project Initiation Grant, funded, $5,000, June 30, 1994 -1995.

6. Computer Aided Instruction in Biochemistry. Dean's Summer Fellowship, funded, $3,000, Summer, 1995.
7. Molecular Biology of Threonine Dehydrogenase, Dean's Summer Fellowship (Paul A. Craig, PI) $4,000, 3 months, June - August, 1996.
8. Molecular Biology of Threonine Dehydrogenase, Dean's Project Initiation Grant (Paul A. Craig, PI) $5,000, 12 months, June, 1996 - May, 1997.
9. Provost's Productivity Grant, Distance Learning in Biochemistry (PI Paul Craig) $13,005, July 1, 1998 - June 30, 1999.
10. Provost's Productivity Grant, Drugs, Science and Society (PI Paul Craig), $21,400, July 1, 1999 – June 30, 2000.
11. FEAD funding, Analysis of natural products by capillary electrophoresis (PI Paul Craig) $1,200, 1999-2000.
12. Structural Bioinformatics at the Protein Data Bank, Faculty Leave for Professional Development, RIT, 50% salary and benefits for the 2001-2002 academic year.
13. Two dimensional gel electrophoresis, First-in-Class, November, 2002 – October, 2003, $12,000.
14. STEMV: Software Tool for Education Molecular Visualization, Dean's Project Initiation Grant, $2,500, 2002-2003.
15. 3D Visualization in Science, Provost's Learning Initiative Grant, $24,500 (Richard Doolittle, P.I.), 2005-2007.
16. Development of a Novel Screening Method for Mutagenic and Carcinogenic Compounds in Pseudomonas putida. Dean's Project Initiation Grant, $10,000 (Laura Tubbs, P.I.), 2005-2007.
17. Virtual Human Visualization and Animation using Adobe Software, Support through the office of Vice President James Watters, $40,600 (Paul A. Craig, P.I), 2006-2008.

Software Development

1. David Mix, Paul A. Craig. JAVA Applets Simulating the Electrophoresis of Protein and DNA. people.rit.edu/pac8612/electro/E_Sim.html, 1998.
2. Paul A. Craig. Biochemistry 1.0 CD-ROM to Accompany Distance Learning Courses in Biochemistry (1009502/702) and Metabolism (1009503/703), 1999.
3. Chris Parkin,* Laura Grell,* Len Slatest, Paul A. Craig. EZ-Viz, an improved educational interface for PyMOL, ez-viz.rit.edu, 2006.
4. Bader AlHarbi, Amanda Fisher*, Emily Sekera*, John Manning*, Janine Garnham*, Aidan Sawyer*, Jill Zapoticznyj,* Paul A. Craig. Java application simulating of two dimensional gel electrophoresis, 2006, http://www.sourceforge.net/projects/JBF.
5. Brett Hanson,*, Charles Westin,* Len Slatest, Paul A. Craig. ProMol, a new PyMOL interface for structure homology searching, http://www.promol.org.

Publications

1. Hanson, B.*, Westin, C.*, Rosa, M.*, Grier, A., Osipovitch, M., MacDonald, M.L.*, Dodge, G.*, Boli, P.M.*, Corwin, C.W.*, Kessler, H.*, McKay, T.*, Bernstein, H.J., Craig, P.A. Estimation of Protein Function Using Template-Based Alignment of Enzyme Active Sites. *BMC Bioinformatics*, 15:87 (2014), doi:10.1186/1471-2105-15-87.

2. Craig, P., Michel, L, Bateman, R. A Survey of Educational Uses of Molecular Visualization, *Biochemistry and Molecular Biology Education*, 41:193-205 (2013) DOI: 10.1002/bmb.20693.
3. Fisher, A.,* Sekera, A.,* Craig, P.A. Simulation of Two Dimensional Electrophoresis and Tandem Mass Spectrometry for Teaching Proteomics. *Biochemistry and Molecular Biology Education,* **40**: 393-399 (2012) **DOI:** 10.1002/bmb.20651.
4. Cody, J.A., Craig, P.A., Loudermilk, A.D.*, Yacci, P.M., Frisco, S.L.*, Milillo, J.R.* Design and Implementation of a Self-Directed Stereochemistry Lesson Using Embedded Virtual Three-Dimensional Images in a Portable Document Format. *Journal of Chemical Education*, **89**: 29-33 (2012) **DOI:** 10.1021/ed100441f.
5. Michel, L.V., Kalmeta, B.*, McCreary, M., Snyder, J.*, Craig, P.A., Pichichero, M.E. Vaccine candidate P6 of nontypable Haemophilus influenzae is not a transmembrane protein based on protein structural analysis. *Vaccine*, **29**: 1624-1627 (2011), doi: 10.1016/j.vaccine.2010.12.082.
6. Mottarella, S.*, Rosa, M.*, Bangura, A.*, Bernstein, H.J., Craig, P.A. ConSCRIPT: A Rasmol to PyMOL Script Convertor. *Biochemistry and Molecular Biology Education*, **38**: 419-422 (2010), doi: 10.1002/bmb.20450.
7. Bernstein, H. J., Craig, P. A., "Efficient Molecular Surface Rendering by Linear-Time Pseudo-Gaussian Approximation to Lee-Richards Surfaces (PGALRS)," *Journal of Applied Crystallography*, **43**:356-361 (2010), doi: 10.1107/S0021889809054326.
8. Kim, T.D., Craig, P.A. Introducing Proteomics in the Undergraduate Curriculum: A Simple 2D Gel Electrophoresis Exercise with Serum Proteins, accepted for publication, *Biochemistry and Molecular Biology Education*, **38**: 29-34 (2010), doi: 10.1002/bmb.20353.
9. Craig, P.A., Federici, E.*, Buehler, M. Instructing Students in Academic Integrity, *Journal of College Science Teaching*, **40**:50-55 (2010).
10. Laura Grell,* Christopher Parkin,* Paul A. Craig, Len Slatest. EZ-Viz – A Tool for Simplifying Molecular Viewing in PyMOL, *Biochemistry and Molecular Biology Education*, 34:402-407, 2006, doi: 10.1002/bmb.2006.494034062672.
11. Kris Cotton, Paul A. Craig. Webionex – a Java simulation of ion exchange chromatography. *BioMoleculesAlive* – the Educational Digital Library of the American Society for Biochemistry and Molecular Biology (http://www.biomoleculesalive.org), 2005.
12. Peng Yang, Paul A. Craig, David Goodsell, Philip E. Bourne. BioEditor - Simplifying Macromolecular Structure Annotation, *Bioinformatics* **19**: 897-898, 2003, doi: 10.1093/bioinformatics/btg103.
13. Paul A. Craig. BioMoleculesAlive.org - The Biochemistry and Molecular Biology Digital Library, *Biochemistry and Molecular Biology Education* **31**, 73-74, 2003, 10.1002/bmb.2003.494031010181.
14. Paul A. Craig. A Project Oriented Biochemistry Laboratory Course, *Journal of Chemical Education*, **76**, 1130-1135, 1999, doi: 10.1021/ed076p1130.
15. Judith Murray-Rust, David A. Chalton, Paul A. Craig. Nucleic acids: Sequences and topology. *Current Opinion in Structural Biology* 12:279-280, 2002, doi:10.1016/S0959-440X(02)00321-4.

* Undergraduate student

16. Jeremy H. Lakey, Paul A. Craig, Judith Murray-Rust. Theory and simulation Macromolecular assemblages. *Current Opinion in Structural Biology* **12**:141-142, doi:10.1016/S0959-440X(02)00300-7.
17. Judith Murray-Rust, Davod A. Chalton, Paul A. Craig. Catalysis and regulation Proteins. *Current Opinion in Structural Biology* **11**:653-654, 2001, doi:10.1016/S0959-440X(01)00263-9.
18. Willfried Schramm, Paul A. Craig, Richard H. Smith, Gregory E. Berger. Cocaine and benzoylecgonine in saliva, serum and urine. *Clinical Chemistry* **39**: 481-487, 1993.
19. Willfried Schramm, Richard H. Smith, Paul A. Craig, Harry E. Grates. Testosterone concentration is increased in whole saliva, but not in ultrafiltrate after toothbrushing. *Clinical Chemistry* **39**: 519-521, 1993.
20. Steven T. Olson, Ingemar Bjork, Roberta Sheffer, Paul A. Craig, Joseph D. Shore, Jean Choay. Role of the antithrombin-binding pentasaccharide in heparin acceleration of antithrombin-proteinase reactions: Resolution of the antithrombin conformational change contribution to heparin rate enhancement. *Journal of Biological Chemistry* **25**: 12528-12538, 1992.
21. Willfried Schramm, Richard H. Smith, Paul A. Craig, David A. Kidwell. Drugs of abuse in saliva: a review. *Journal of Analytical Toxicology* 16:1-9, 1992.
22. Paul A. Craig, Eugene Dekker. The sulfhydryl content of *L*-threonine dehydrogenase from *Escherichia coli* K-12: relation to catalytic activity and Mn^{2+} activation. *Biochimica Biophysica Acta*, **1037**:30-38, 1990, doi: 10.1016/0167-4838(90)90098-Z.
23. Willfried Schramm, Richard H. Smith, Thomas M. Jackson, Paul A. Craig, Harry E. Grates, Laura L. Minton. Rapid solid-phase immunoassay for 6-keto prostaglandin F_{1a} on microplates. *Clinical Chemistry* **36**: 509-514, 1990.
24. Willfried Schramm, Richard H. Smith, Paul A. Craig, Se-Hwan Paek and Hai-Hang Kuo. Determination of free progesterone in an ultrafiltrate of saliva collected in situ. *Clinical Chemistry* **36**:1488-1493, 1990.
25. Paul A. Craig, Steven T. Olson, Joseph D. Shore. Transient kinetics of heparin-catalyzed protease inactivation by antithrombin III: Characterization of assembly, product formation, and heparin dissociation steps in factor X_a reaction. *Journal of Biological Chem*istry, **264**:5452-5461, 1989.
26. Paul E. Bock, Paul A. Craig, Steven T. Olson, Pratap Singh. Isolation of human blood coagulation a-factor Xa by soybean trypsin inhibitor-sepharose chromatography and its active-site titration with fluorescein mono-*p*-guanidinobenzoate. *Archives of Biochemistry and Biophysics* **273**:375-388, 1989.
27. Joseph D. Shore, Steven T. Olson, Paul A. Craig, Jean Choay, Ingemar Bjork. Kinetics of heparin action. *Annals of the New York Academy of Science* **556**, 75-80, 1989.
28. Paul A. Craig, Eugene E. Dekker. Cd^{2+} Activation of L-threonine dehydrogenase from *Escherichia coli* K-12. *Biochimica Biophysica Acta* **957**: 222-229, 1988.
29. Paul A. Craig, Eugene E. Dekker. L-Threonine dehydrogenase from *E. coli* K-12: thiol-dependent activation by Mn^{2+}. *Biochemistry* **25**:1870-1876, 1986.

Presentations

1. Paul A. Craig. Educational Assessment and Resources for Molecular Visualization, ASBMB Special Educational Symposium, Seattle, WA, August 4-7, 2013.
2. Paul A. Craig, Lea Michel, Robert Bateman. Educational Uses of Molecular Visualization, ASBMB, San Diego, CA, April 21-25, 2012.
3. Craig, P.A. Scientific Visualization at RIT, Vassar College, April 23, 2009.
4. Richard Doolittle and Paul A. Craig. Fantastic Voyage – 3D Visualization in Science. (invited seminar) Canadian Association of Pharmaceutical Distributors and Manufacturers, Phoenix AZ, May 2006.
5. Jillian Brandon,* Gwen DeCelles, Richard Doolittle and Paul A. Craig. Creation of a Virtual Reality/3D Environment of the Pancreas from Gross to Microscopic Level Slice of Life, Lausanne, Switzerland, July 5-8, 2006.
6. Laura Grell,* Christopher Parkin,* Paul A. Craig and Len Slatest. EZ-Viz – A Tool for Simplifying Molecular Viewing in PyMOL, The Protein Society Annual Meeting, San Diego, CA, August 5-9, 2006.
7. Julia L. Kohn,* Laura Ellen Tubbs, and Paul A. Craig Protein analysis using phoretix 2D software analysis of 2D-gels and mass spectrometry, American Chemical Society National Meeting, August, 2006, San Francisco, CA.
8. Brett Hanson,* Charlies Westin,* Len Slatest, Paul A. Craig EZ-Viz Version 2.0. Northeastern Regional Meeting of the American Chemical Society, Binghamton, NY, October, 2006.
9. Paul A. Craig. Implementing a Peer Review System in a Digital Library, NSDL PI/PD All Projects Meeting, Chicago, IL, November 14-17, 2004.
10. Paul A. Craig. BioMoleculesAlive, the ASBMB Digital Library, American Society of Biochemistry and Molecular Biology, San Diego, CA, April, 2005.
11. Paul A. Craig. Proteomics in Undergraduate Education, American Society of Biochemistry and Molecular Biology, San Diego, CA, April, 2005.
12. Paul A. Craig. Using simulations to introduce proteomics and bioinformatics to undergraduates. ASBMB Annual Meeting, Boston, MA, June 12-16, 2004.
13. Yolanda George, Marguerite Coomes, Melinda Lowe, Paul A. Craig. The BioSci Education Network (BEN) Collaborative Workshop (invited speaker), MERLOT International Conference, Vancouver, BC, August, 2003.
14. Yolanda George, Marguerite Coomes, Melinda Lowe, Paul A. Craig. BiosciEdNet (BEN): a Portal to Digital Libraries for Teaching in the Biological Sciences (invited seminar), MERLOT International Conference, Vancouver, BC, August, 2003.
15. Paul A. Craig, Marlene Kayne, Tim Driscoll. BioMoleculesAlive, the ASBMB Digital Library (invited seminar), ASBMB Annual Meeting, San Diego, CA, April, 2003.
16. Paul Craig, Peng Yang and Phil Bourne. Bioeditor: A Tool for Structure Annotation (invited seminar). University of California, Santa Barbara, Computer Science Colloquium, January 14, 2002.
17. Paul A. Craig, Peng Yang and Phil Bourne. Bioeditor: A Tool for Structure Annotation (invited seminar). American Society of Biochemistry and Molecular Biology Annual Meeting, New Orleans, LA, April, 2002.
18. Bohdan Schneider and Paul A. Craig. The Protein Data Bank (invited seminar). From Genes to Drugs via Crystallography, Erice, Italy, May 24-June 2, 2002.
19. Paul A. Craig, Project Oriented Biochemistry Laboratory (invited seminar), Biennial Conference on Chemical Education, July 30 – August 3, 2000 (invited seminar).

20. Jonathan W. Cooper, Paul A. Craig. Capillary electrophoresis determination of the natural product yohimbine through factorial design. ASBMB annual meeting, Boston, MA, June 4–8 , 2000.
21. Paul A. Craig. Learning by drawing in an introductory organic and biochemistry course. ASBMB annual meeting, Boston, MA, June 4–8, 2000.
22. Paul A. Craig, David Mix, Kristin Cotton. Simulating biochemical separations using protein data bank files. ISMB2000, San Diego, CA, August 20–24, 2000.
23. Paul A. Craig. Distance Learning at RIT, Part 1: Assessment of Tools (invited seminar). American Chemical Society Annual Meeting, New Orleans, LA, August 22-26, 1999.
24. Mark J. Biscone,* Paul A. Craig. Purification of threonine dehydrogenase using hydrophobic interaction chromatography. NCUR 99, Rochester, NY, April 10, 1999.
25. Paul A. Craig, Use of Internet resources in the undergraduate biochemistry laboratory, American Society of Biochemistry and Molecular Biology, Washington, D.C., May 16-20, 1998.
26. Paul A. Craig, David Mix, Simulation of Electrophoresis on a Web Page Using JAVA, IUBMB Satellite #3, Biochemical Education, San Francisco, CA, August 22-23, 1997.
27. Paul A. Craig. Project Oriented Biochemistry Laboratory Course for Undergraduates Laboratory, IUBMB Satellite #3, Biochemical Education, San Francisco, CA, August 22-23, 1997.
28. Lisa Sturm,* Paul A. Craig. Purification of L-threonine dehydrogenase from Enterobacter aerogenes. ACS Northeast Regional Meeting, Saratoga Springs, NY, June 22-25, 1997.
29. Carrie Benware,* PA Craig. Rapid colorimetric enzyme assay using a water soluble tetrazolium dye, MTS. ACS Northeast Regional Meeting, Saratoga Springs, NY, June 22-25, 1997.
30. Paul A. Craig, Ming Ge, Kristin Cotton. Practice Makes Perfect: Simulation as Preparation, ACS National Meeting, Orlando, Florida, August, 1996.
31. Paul A. Craig, Careers in Chemistry, Building a Chemical Career in the 21st Century, 25th Northeast Regional Meeting of the American Chemical Society, Rochester, NY, October, 1995.
32. Paul A. Craig and Ming Ge. Computer-Aided Education in the Undergraduate Biochemistry Laboratory. American Society of Biochemistry and Molecular Biology, San Francisco, CA, May 21-25, 1995.