Curriculum Vita
Tricia A. Ferrett

Education

Grinnell College	Chemistry, with Honors	B.A., 1981
U.C. Berkeley	Physical Chemistry	Ph.D., 1986
NIST, Gaithersburg, MD	Chemical Physics	Postdoc, 1987-1988

Appointments & Positions

Co-Director of the Carleton Interdisciplinary Science & Math Initiative, CISMI (2008 – 2011)
Assistant Professor (1990-1995), Associate Professor (1996-2003), Professor (2003-present), Department of Chemistry, Carleton College
Visiting Scholar, Carnegie Foundation for the Advancement of Teaching (2008, sabbatical)
Director and Co-director of Carleton's 6th HHMI grant (2008-2012)
Director of Carleton's 5th Howard Hughes Medical Institute (HHMI) Grant (2003-2007)
Carnegie Scholar, 2005-2006, Carnegie Foundation for the Advancement of Teaching, Integrative Learning (research partner: Joanne Stewart, Hope College).
Founding Director of CISMI (2003-2007)
Visiting Scientist, University of Wisconsin-Madison, Weisshaar group (1997-1998, sabbatical)
Visiting Scientist, SuperACO Synchrotron, Orsay, France (1994)
Visiting Assistant Professor, Department of Chemistry, American University (1989-1990)
Visiting Assistant Professor, Department of Chemistry, Swarthmore College (1988-1989)
National Institute of Standards & Technology (NIST). Guest Scientist (1988-1990)

Courses Taught

1. *Introductory Chemistry*, with interdisciplinary ChemConnections modules: global warming, ozone hole, dietary fat and nutrition, star composition, and computer chip technology
2. *Physical Chemistry*: Thermodynamics, Kinetics, Quantum Chemistry, Advanced Kinetics and Spectroscopy Laboratories (with research-style projects)
3. *Interdisciplinary Courses*
   a. Chemistry at the Nanoscale (CHEM 362, current). Discussion-based seminar focused on recent literature related to basic science and applications in medicine, electronics, and renewable energy
   b. Focus on Cultivating Scientists (FOCUS) - Diverse STEM cohort of 16 students, class of 2019. Mentoring, advising, academic and career support. Interdisciplinary projects on: 1) data analysis of leaf and soil proxies related to compost tea use at a local organic farm, and 2) collaborative research and writing project on fracking and local frac sand mining (IDSC 198 and 298)
   c. Global Issues Team-Based Interdisciplinary Advanced Research Seminar, mentoring group of 3 seniors on project related to scientific, environmental, and historical perspectives on the Glen Canyon Dam (IDSC 398, current). Part of Carleton Center for Global & Regional Studies

d. Senior Capstone Seminars: molecular electronics, environmental and atmospheric chemistry, chemical oceanography, biological applications of gold nanorods, materials science, ion channel and transporter biophysics, nanochemistry and electronics, and renewable energy
e. Abrupt Climate Change, part of environmental studies program (ENTS 288, current)
f. Mining & the Environment, first-years seminar (ENTS 100, current). Copper and diamond mining, with a focus on N. MN prospective copper mines near the Boundary Waters Canoe Area Wilderness (BWCAW).
g. "Sleuthing the Sistine," on controversy of restoration of Michelangelo's Sistine Chapel frescos. With Prof. Kettering in Art History (CHEM 100, 1994-1995)

Professional Organizations & Service

- Project Kaleidoscope (PKAL): Faculty for the 21rst Century, 1994 cohort
- American Physical Society (APS)
- American Geophysical Union (AGU)
- Sigma Xi, The Scientific Research Society (Carleton officer 1991-1997)
- Phi Beta Kappa

Synergistic Activities

1. *Chemistry Curriculum Reform.* Workshop Leader for the Multi-Initiative Dissemination Project (MID), ChemLinks, and the ModularChem Consortium (MC^2). MID workshops to introduce faculty to four NSF Systemic Change Initiatives in Chemistry (2001). ChemLinks/MC^2 workshops, 1/2-3 days in length, introduce faculty to ChemConnections modules, active/collaborative learning, and adaptation and reform issues (1995-2000, co-leader at 14 workshops).
2. *Project Kaleidoscope* (PKAL). Faculty for the 21st Century (FAC21, 1994-present). Planning Leadership for FAC21 annual meeting (1994, 1995). FAC 21 Leadership Institute (1997). Chemistry Innovation workshop leader (1995, 1997). "Science for All Students" workshop attendee (1996). Leadership II Department Chairs workshop attendee (2000). Leadership Initiative, Interdisciplinary Science (2004-2006).
3. *Assessment of Student Learning*. Extensive experience gained through the ChemLinks project in the 1990's, and through overseeing assessment and project evaluation for Carleton's 5th HHMI grant. Currently involved in leading (with David Lopatto) an HHMI-funded consortium assessment project on interdisciplinary learning with Grinnell, Carleton, Hope, Whitman, and St. Olaf Colleges.
4. *PKAL Pedagogies of Engagement Project*. Senior Personnel. Led, designed, or helped facilitate multiple faculty workshops (below). On writing team (fall/winter 2008) for new NSF proposal to continue project (not funded, in part due to uncertainty in future of PKAL leadership).
5. *Broadening Access to Science*. Mellon 23 grant on Broadening Access to STEM (with Arjendu Pattanayak and colleagues from other colleges). Helped organize summer 2009 workshop on developing a comprehensive plan for broadening access to STEM. Helped write proposal and administer Mellon 23 project with Arjendu Pattanayak (Carleton) and Jim Swartz (Grinnell). On team to create/manage new project web site (with Wendy Raymond from Williams College, and Jim Swartz).

Representative Publications

1. T.A. Ferrett, D.M. Geelan, W. M. Schlegel, and J.L. Stewart eds. (2013). *Connected Science: Strategies for Integrative Learning in College*, Indiana University Press: Bloomington, IN.
2. Tricia Ferrett and Joanne Stewart, *Integrative Science Learning by Novices: Portraits of Creative & Emergent Thinking & Practice*, Conference Proceedings for Innovations in the Scholarship of Teaching and Learning at the Liberal Arts Colleges, Northfield, MN (2007).
3. Tricia A. Ferrett, "Is This Real Science?" in *Reflections on Learning as Teachers*, eds. Susan Singer and Carol Rutz, College City Publications, p. 163-175 (2004). Also published in the *Astronomy Education Review*, Issue 1, Vol. 3, p. 146-155 (2004).
4. R, V. Kirss, S, Laursen, S, Anthony, T, Ferrett, H, Mernitz, and G, Lisensky, *Chemistry: The Science in Context, Instructor's Resource Manual with ChemConnections Activities*, W. W. Norton (2003).
5. S. Anthony, T.A. Ferrett, and J. Bender, *What Should We Do About Global Warming?*, ChemConnections Module for college chemistry, W.W. Norton, Student Manual, revised ed. (2004). Beta version published with John Wiley & Sons, Inc. (1998).
6. T. A. Ferrett and S. Anthony, *Why Does the Ozone Hole Form?,* ChemConnections Module for college chemistry, W.W. Norton, Student and Instructor Manuals, revised ed. (2004). Beta version published with John Wiley & Sons, Inc. (1998).
7. S.H. Southworth, T.A. Ferrett, J.E. Hardis, A.C. Parr, J.L. Dehmer, "Valence Shell Autoionization of NO," *Physics Essays* 13, 290-296 (2000).
8. Y. Wen, M. Porembski, T.A. Ferrett, and J.C. Weisshaar, "H_2 Elimination Products from Neutral Zr + Alkene Reactions in the Gas Phase," *J. Phys. Chem. A* 102, 8362-8368 (1998).
9. J.D. Mills, J.A. Sheehy, T.A. Ferrett, S.H. Southworth, R. Mayer, D.W. Lindle, and P.W. Langhoff, "Nondipole Resonant X-Ray Raman Spectroscopy: Polarized Inelastic Scattering at the K Edge of Cl_2," *Phys. Rev. Lett.* 79, 383-386 (1997).
10. P. Roy, R.J. Bartlett, W.J. Trela, T.A. Ferrett, A.C. Parr, S.H. Southworth, J.E. Hardis, V. Schmidt, and J.L. Dehmer, "Vibronic Coupling and other Many-Body Effects in the $4\sigma_g^{-1}$ Photoionization Channel of CO_2," *J. Chem. Phys.* 94, 949-956 (1991).
11. T.A. Ferrett, D.W. Lindle, P.A. Heimann, M.N. Piancastelli, P.H. Kobrin, H.G. Kerkhoff, U.E. Becker, W.D. Brewer, and D.A. Shirley, "Shape-resonant and Many-electron Effects in the S 2p Photoionization of SF_6," *J. Chem. Phys.* 89, 4726 (1988).
12. P. Roy, T.A. Ferrett, V. Schmidt, A.C. Parr, S.H. Southworth, J.E. Hardis, R. Bartlett, W. Trela, and J.L Dehmer, "A Study of Vibronic Coupling in the C State of CO_2^+", *J. de Physique* 48, C9-765 (1987).
13. T.A. Ferrett, D.W. Lindle, P.A. Heiman, W.D. Brewer, U. Becker, H.G. Kerkhoff, and D.A. Shirley, "Lithium 1s Main-Line and Satellite Photoemission: Resonant and Nonresonant Behavior", *Phys. Rev. A* 36, 3172 (1987).
14. T.A. Ferrett, D.W. Lindle, P.A. Heimann, H.G. Kerkhoff, U.E. Becker, and D.A. Shirley, "Sulfur 1s Core-Level Photoionization of SF_6", *Phys. Rev. A* 34, 1916 (1986).

External Research & Education Grants

1. **ACM SAIL Seminar Team 2017** (Carleton College) on *Wilderness in the Anthropocene*, Summer 2017 with Nancy Braker (Carleton Arb Director) and Stephen Mohring (Art/Art

History). Developed wilderness readings and an enhanced 3-day field trip to Ely, MN for ENTS 100 (Mining and the Environment). Began redesign of this seminar to focus exclusively on the conundrum at the intersection of iron and copper mining in N. MN, environmental degradation, climate change, and the need for these metals for renewable energy technology.

2. **ACM SAIL Seminar Team 2014** (Carleton College) on *Contested Spaces*, Summer 2014 with Nancy Braker (Carleton Arb Director) and Ross Elfline (Art History). Developed two curricular projects: a) final project in Abrupt Climate Change course on design of a new Arb Center focused on an unsteady future climate, and 2) a first-year seminar on mining and the environment, including a case study and field trip to Ely, MN to study the Twin Metals copper/nickel mining project proposed near the Boundary Waters Canoe Area (BWCA).
3. Senior Personnel, **National Science Foundation** (NSF) S-STEM grant, $600,000 (2009-2013). *Cohort Development: Growing a Community of URM Scientists at Carleton*.
4. Carleton's 6th Howard Hughes Medical Institute (**HHMI**) Grant, $1.6 million (2008-2012). For faculty and curriculum development related to neuroscience, environmental science, and computational modeling of complex systems; mentoring and cohort programs for broadening access to science; undergraduate student research.
5. Carleton's 5th **HHMI** Grant, $800,000 (2004-2008). For faculty/curriculum development in seven interdisciplinary areas; broadening access to science; undergraduate student research. Program Director.
6. **NSF Chemistry Systemic Change** grant, *ChemLinks Coalition: Making Chemical Connections*. Liberal arts college consortium effort to catalyze systemic national reform in undergraduate chemistry curricula, $2.7 million (1995-2002). PI Brock Spencer, Beloit College. Carleton portion for module development.
7. Senior personnel, **NSF Planning Grant** for Reforming Introductory Chemistry Curriculum (1994), $50,000.
8. **NSF 1992 Young Investigator Award**. Support for teaching and undergraduate research (1992-1999), $458,000 including Carleton matching funds.
9. 1991 **NSF Research Planning Grant for Women**, $18,000; Petroleum Research Fund (**PRF**) of the American Chemical Society, $18,000; **Research Corporation**, $30,000.

Scholarly Interests

I have co-authored over 35 publications in synchrotron radiation research involving experiments in gas-phase core/valence photoelectron spectroscopy aimed at elucidation of electron correlation effects. In 1991, I established an undergraduate research program at Carleton with the goal of understanding general principles that govern gas-phase molecular fragmentation dynamics induced by soft X-rays. In 1994 we completed construction of a new system capable of measuring one electron and several positive ions in coincidence using a newly-designed mass spectrometer. Multi-dimensional mass spectroscopy experiments were carried out in the 1990's with the help of sixteen undergraduate researchers.

My research is now focused in the area of *scholarship of teaching and learning* (SoTL) related to integrative and interdisciplinary science-rich learning. My current projects involve study of "connected science" learning and teaching - an approach that emphasizes integrative learning by involving students in authentic, engaged pedagogies and compelling and relevant modern questions. This work began with my Carnegie project and now extends to collective SoTL scholarship with a book volume I created and co-edited. The book, titled *Connected Science: Strategies for Integrative Learning in College,* is in a new scholarship of teaching and learning series at Indiana University press and was published in July 2013. New and future projects relate to contemplative pedagogies and the complexity of human learning.

Curriculum Reform & Science Leadership

For a decade I was part of the core leadership team for the ChemLinks Coalition, one of NSF's systemic initiatives to improve the teaching of introductory college chemistry. The ChemLinks Coalition, in close collaboration with the ModularChem Consortium (MC^2) at U.C. Berkeley, wrote a dozen ChemConnections modules (now published by W.W. Norton, Inc.) driven by interesting modern questions so science is taught in a context which engages students in actively "learning as chemists do." I was been a member of the Learning and Teaching Group, the Environmental subgroup, the Executive Committee, and the Publishing Committee. In addition to co-authoring two ChemConnections Modules (above), I have contributed significantly to three other modules through activity creation and major editing.

Through the founding and creation of CISMI at Carleton (2003-2011), I have created, supported, and overseen numerous programs in faculty and curriculum development, undergraduate research, and broadening access to science. Most of these programs revolve around the theme of helping students and faculty better address integrative, real-world, complex systems and problems that require a scientific perspective.

Undergraduate Education: Representative Workshops, Panels, & Invited Talks

1. PKAL presentation at the AAC&U Annual Meeting on Developing Comprehensive Institutional Plans for Success in More Inclusive STEM Undergraduate Education, with Jim Swartz (Grinnell) and Wendy Raymond (Williams). Jan. 22, 2010, Washington, D.C.
2. PKAL session on "Sharing our Work", MnSCU Realizing Student Potential Conference, Jan.15, 2010. Minneapolis Community and Technical College, Minneapolis, MN.
3. Active Learning Strategies, PKAL Across the Disciplines, April 24-25, 2009. Bemidji State University, Bemidji, MN.
4. PKAL Session at MnSCU Realizing Student Potential session, Feb. 27-28, 2009. Integrating Technology, Strengthening Community. Minneapolis Community and Technical College, Minneapolis, MN.
5. October 2008 "Moving to Action" MnSCU workshop, Central Lakes College, Brainerd, MN.
6. Project Kaleidoscope (PKAL) Summit on Pedagogies of Engagement (PoE), Century College, White Bear Lake, MN, Sept. 2008. On project team; facilitated a session with "pedagogical pioneers" in STEM fields on PKAL's proposed resources for PoD.
7. Biology Education Conversation, National Science Foundation (NSF) and the American Association for the Advancement of Science (AAAS), Chicago, IL, June 2008.

8. Carnegie Foundation for the Advancement of Teaching, invited talk on the "Connected Science" book project, March 2008.
9. Mellon 23 Assembly on Interdisciplinarity, St. Paul, MN, Feb. 15-17 2008. Invited plenary talk with Joanne Stewart (Hope College) on "Student Integrative Learning: A Vision of the Possible". On organizing committee for assembly of Deans and faculty from over 20 liberal arts colleges funded by the Mellon Foundation.
10. Faculty workshop on the Scholarship of Teaching and Learning at Gustavus Adolphus College, Oct. 2007. With 2005 Carnegie Scholar Michael Smith (Ithaca College).
11. Teagle Foundation Fresh Thinking Grant project meeting on "Defining Social Pedagogies and their Relevance to Liberal Education", August 2007, Washington, D.C. (Project PIs Randy Bass and Heidi Elmendorf, Georgetown University).
12. Grinnell College research talk on integrative learning related to Grinnell's "Expanding Knowledge Initiative", April 19, 2007. Co-presented with Joanne Stewart (Hope College).
13. Midstates Consortium for Math and Science, Workshop on Interdisciplinary Science Education, Feb. 2007, Northfield, MN. Workshop organizer and facilitator.
14. Associated Colleges of the Midwest (ACM) Conference on Women's Leadership, Northfield MN, spring 2005. On invited panel to talk about leadership.
15. Carleton Faculty Workshops on Interdisciplinarity, Carleton College. Dec. 2003, 2004 (Epistemology), and 2005 (What is Carleton's Energy Future?). Workshop leader and planner.
16. Biennial Conference on Chemical Education (BCCE), Bellingham, WA, July-Aug. 2002. Co-led workshop on teaching with *ChemConnections* modules. Session chair for *ChemConnections* session.
17. Knight Higher Education Collaborative Roundtable on "Who Owns Teaching?", Princeton, NJ, June 2001. Resulting paper in *Policy Perspectives*, Aug. 2002, Vol. 10, No. 4.
18. Multi-Initiative Dissemination (MID) Workshop for NSF Chemistry Systemic Change Projects, Pueblo, CO, April 2001. Workshop Leader.
19. ChemLinks/MC^2 Module Adapters Workshops. Beloit, WI, August 1997, June 1998 & 2000; Olympia, WA, July 1999. Workshop leader.
20. Wellesley and Wesleyan Colleges, March 1998. Seminars on ChemLinks and the ozone module, consultation with Chemistry Departments about module adoptions.
21. Gordon Conference on Innovations in College Chemistry Teaching, Ventura, CA, Jan. 1998. ChemLinks/MC^2 workshop leader.
22. PKAL Chemistry Workshop Leader, Colorado Springs, CO, Oct. 1997. Curricular Reform in ChemLinks and MC^2: The Ozone Module.
23. PKAL Meeting of Faculty for the 21st Century, Minneapolis, MN, Nov. 1995. Co-led plenary activity on curricular innovations in ChemLinks with Prof. Jerry Mohrig.
24. PKAL Meeting on Curricular Innovation in Chemistry, Hendrix College, Conway, AK, Sept. 1995. Led activity on active pedagogies and the ozone module.

Representative Research Conference Presentations (presenters in *italics*)

1. Meeting of the International Society for the Scholarship of Teaching and Learning (ISSOTL), Milwaukee, WI. Oct. 2011. Talk on "Engaging faculty in collaborative inquiry: A multi-institutional study of interdisciplinary learning in science-rich courses", *Whitney Schlegel* (Indiana University), & *Joanne Stewart* (Hope College), and *Trish Ferrett*.

2. AAC&U/PKAL meeting on Engaged STEM Learning, Mar. 15, 2011, Miami, Fl. "A Multi-institutional Study of Interdisciplinary Teaching and Learning in STEM", *Tricia Ferrett*, *Whitney Schlegel*, *Joanne Stewart*, & *Jim Swartz* (Grinnell College).
3. AAC&U Annual Meeting, Jan. 27, 2011, San Francisco, CA. "Globally-Focused Learning in the Interdisciplinary Classroom: A Research-Based Framework for Learning Goals and Pedagogies in Science-Rich Courses", *Tricia Ferrett*, *Whitney Schlegel* & *Jim Russo* (Whitman College).
4. Meeting of ISSOTL, Bloomington, IN, Oct. 2009. "Lingering in the Commons: Collective Inquiry in the Scholarship of Teaching and Learning", *Tricia Ferrett, David Geelan, Joanne Stewart, Matt Fisher, Jeff Bernstein, Michael Smith, & Rebecca Nowacek*.
5. AAC&U meeting on "Engaging Science, Advancing Learning", Providence, RI, Nov. 2008. "Connected Science: Scholarly Evidence, Exemplars, and a Vision for Integrative Learning", *Tricia Ferrett, Whitney Schlegel*, & *Matt Fisher* (St. Vincent College). LEAP Campus Action Network Exemplar.
6. Meeting of ISSOTL, Edmonton, BC, Oct. 2008. "Connected Science: Mapping Out 'Integrative Moves' by Novices in General Education Seminars", *Tricia Ferrett* & Joanne Stewart.
7. Innovations in the Scholarship of Teaching and Learning at the Liberal Arts Colleges, Northfield, MN, April 2007. "Integrative Science Learning by Novices: Portraits of Creative & Emergent Thinking & Practice", *Tricia Ferrett* & Joanne Stewart.
8. Meeting of ISSOTL, Washington, D.C., Nov. 2006. "Portraits of Integrative Insight: First-Year Students Explore Abrupt Change", *Tricia Ferrett*.
9. National Conference on Undergraduate Research (NCUR), Lexington, VA, April 2005. Poster by *Dana Kraus* ('06) on our research about teaching abrupt climate change to first-year students.
10. Minnesota Section of the ACS, St. Paul, MN, April 2001. Talk by *Victor Sussman* ('01) on our laboratory research.
11. Meeting of the Division of Atomic, Molecular, and Optical Physics (DAMOP), Santa Fe, NM, May 1998. Poster by *T. Ferrett* on mechanistic results of C_4F_8 fragmentation.
12. DAMOP, Ann Arbor, MI, May 1996. Poster by *T. Ferrett* on fragmentation studies of C_4F_8.
13. DAMOP, Toronto, Canada, May 1995. Talk by *Kris Poduska* ('96) nominated for special undergraduate research symposium.
14. NCUR, April 1994. Talk by *Louis Madsen* titled "Coincidence Mass Spectrometer Design."
15. NCUR, Salt Lake City, UT, March 1993. Poster by *David Vosen* ('94) titled "Fragmentation of Chlorofluoromethanes using Synchrotron Radiation."
16. DAMOP, Reno, NV, May 1993. Poster by *T. Ferrett* titled "Fragmentation of CF_3Br Induced by Fluorine 1s Core Excitation: Energy Resolved Auger Electron Multiple-Ion Coincidence Measurements."
17. Meeting of DAMOP, Chicago, IL, May 1992. Poster by *T. Ferrett* titled "Fragmentation of CF_3Cl and CF_2Cl_2 Induced by Fluorine 1s Core Excitation: Electron Multiple-Ion Coincidence Measurements."
18. National Organization for the Professional Advancement of Black Chemists and Chemical Engineers, New Orleans, April 1992. Research talk by *Michelle Bayne* ('92).

Recent Reviewing/Consulting Work
External Program Review team, Kenyon College, Chemistry Department
External Program Review team, New School, Interdisciplinary Science Program
External Program Review team, Reed College Chemistry Department
External Department Review team, Wellesley College, Chemistry
External Program Review team, Reed College, Environmental Studies
Review of materials for colleagues up for tenure or promotion (1-2 yearly)
Chemistry textbooks, publisher reviews

Carleton College Service
Library and IT Committee (LIBIT)
Capital Funding & Priorities Committee
Chemistry Department Assessment Coordinator
Visuality Initiative Steering Committee
Carleton Science/Math Steering Committee
Argument & Inquiry Seminar Committee
Carleton Classroom Committee
Chair and Co-Chair of the HHMI/CISMI Advisory Board
College Curriculum Design Team
Writing Advisory Committee
Critical Thinking Team, Carleton Teagle grant on assessment of student learning
Faculty Affairs Committee (elected)
Science Division Facilitator (3 years ending 2002)
Dean Selection Committee (elected)
Faculty Grants Committee (elected)
Committee for Student Life (elected)
Library Committee & Library Master Planning Steering Committee
Chemistry Department Chair, Associate Chair