Stanford

Charlie Cox

Lecturer, Chemistry

Curriculum Vitae available Online

Bio

BIO

Dr. Charlie Cox's primary interests lie in the field of chemical education, and in bringing cutting-edge science into the undergraduate classroom. He focuses on methods to promote active learning in organic and general chemistry, targeting improvements in problem solving, critical thinking and retention.

Charllie T. Cox was born in North Carolina. He took a strong interest in chemistry beginning in high school. As an undergraduate at North Carolina State U. (B.S. 2001) he explored research in biophysical chemistry, analyzing proteins with differential scanning calorimetry, and participated on a chemical education project focused on SCALE-Up curricula. His doctoral study at Clemson U. (Ph.D. 2006) required two projects—one chemistry-based and another education-oriented. He completed the first in a physical organic research group analyzing fullerenes and porphyrins. For the latter, he worked with Dr. Melanie Cooper, developing interventions in general and organic chemistry and evidence-models to support curricular reform. He also collaborated with Dr. Ron Stevens, applying IMMEX software for assessment of chemistry learning and problem solving (www.immex.com). Dr. Cox's postdoctoral work in chemical education at the University of New Hampshire further motivated him to seek a career in teaching. He has taught general, inorganic, advanced organic, and analytical chemistry, as well as teaching methodology. He joined the Stanford Department of Chemistry in 2010, and is currently Lecturer of Chemistry and Coordinator for T.A. Teaching and Safety Training.

Teaching and Research

Dr. Cox teaches undergraduate organic, analytical and biochemistry. His research and course development emphasize techniques to promote active learning, including the use of flipped classrooms and case studies to improve learning and retention.

Active Learning: Dr. Cox is actively designing and applying course frameworks that include a cyclic "group-individual-group" approach: In section, students work in groups to solve problems, and develop critical thinking by analyzing case-studies. This work is reinforced by an individual homework assignment, which is discussed in groups during the following lecture. Dr. Cox is implementing this approach in general, organic, and biochemistry courses to provide a learning structure in which students can actively work together yet still obtain individual attention.

Flipped Classrooms: As part of active learning methods, Dr. Cox is developing best practices for implementing a flipped classroom paradigm in biochemistry. In this approach, lectures focus predominantly on group discussion with clicker questions designed to further facilitate understanding.

Case Studies: Dr. Cox is developing case studies for general, organic, and bio-chemistry, as well as evidence-based methods to assess their effectiveness in promoting problem solving, critical thinking and long-term retention.

Advising

Dr. Cox serves as a pre-major advisor for freshman and sophomores, helping students with course selection, internship planning, and options for study abroad and research experience. He also serves as a chemistry major advisor and the chapter advisor for the social chemistry fraternity Alpha Chi Sigma.

TA & Safety Training

Dr. Cox coordinates teaching assistant and departmental safety training. This three-day event covers teaching practices, safety and university policies. In this role, Dr. Cox has developed hands-on safety training modules for graduate students and an online interactive safety training module for undergraduate students, which has disseminated at national meeting of the American Chemical Society.

Leland Scholar Program

Dr. Cox co-instructs the science portion in the Leland Scholars Programs for incoming freshmen with Dr. Jennifer Schwartz Poehlmann. The program provides a discussion of chemistry in the context of important considerations such as drug design, pollution and energy.

ACADEMIC APPOINTMENTS

- Lecturer, Chemistry

ADMINISTRATIVE APPOINTMENTS

- Teaching Postdoc, University of New Hampshire, (2006-2007)

HONORS AND AWARDS

- Best Freshman Professor, Student Activities Board, Georgia Institute of Technology (2009)

BOARDS, ADVISORY COMMITTEES, PROFESSIONAL ORGANIZATIONS

- Reviewer, Journal of Chemical Education (2007 - present)
- Reviewer, Journal of College Science Teaching (2007 - present)

PROFESSIONAL EDUCATION

- Postdoc, University of New Hampshire , Chemistry Education (2007)
- Ph.D., Clemson University , Chemistry (2006)
- B.S., North Carolina State University , Chemistry (2001)

Teaching

COURSES

2017-18

- Analytical Chemistry Laboratory: CHEM 134 (Spr)
- Chemical Principles Accelerated: CHEM 31X (Aut)
- Exploring Research and Problem Solving Across the Sciences: CHEM 10 (Aut)
- Introduction to Organic Chemistry: CHEM 1 (Sum)
- Organic Chemistry Lab II: CHEM 2L (Sum)
- The Chemical Principles of Life I: CHEM 141 (Win)

2016-17

- Analytical Chemistry Laboratory: CHEM 134 (Spr)
- Chemical Principles Accelerated: CHEM 31X (Aut)
- Exploring Research and Problem Solving Across the Sciences: CHEM 10 (Aut)

- Introduction to Organic Chemistry: CHEM 1 (Sum)
- Organic Chemistry Lab II: CHEM 2L (Sum)
- The Chemical Principles of Life I: CHEM 141 (Win)

2015-16

- Analytical Chemistry Laboratory: CHEM 134 (Spr)
- Chemical Principles Accelerated: CHEM 31X (Aut)
- Exploring Research and Problem Solving Across the Sciences: CHEM 10 (Aut)
- Organic Chemistry Lab I: CHEM 2L (Sum)
- Physical Biochemistry: CHEM 135 (Win)
- Structure and Reactivity: CHEM 1 (Sum)

2014-15

- Analytical Chemistry Laboratory: CHEM 134 (Spr)
- Chemical Principles Accelerated: CHEM 31X (Aut)
- Exploring Research and Problem Solving Across the Sciences: CHEM 10 (Aut)
- Introduction to Organic Chemistry Lab: CHEM 1L (Sum)
- Organic Chemistry Lab I: CHEM 2L (Sum)
- Synthesis Laboratory: CHEM 132 (Win)

Publications

PUBLICATIONS

- **Implementation of Peer-Reviewed Homework Assignments** *Journal of College Science Teaching*
  Zare, R. N., Cox Jr. , C. T., Murphy, K., Bayas, C.
  2017; 046
- **Incorporating More Individual Accountability in Group Activities in General Chemistry** *Journal of College Science Teaching*
  Cox, C. T.
  2015; 44 (3): 30
- **An assessment of the effect of collaborative groups on students' problem-solving strategies and abilities** *JOURNAL OF CHEMICAL EDUCATION*
  Cooper, M. M., Cox, C. T., Nammouz, M., Case, E., Stevens, R.
  2008; 85 (6): 866-872
- **Derivatization of fullerenes: An organic chemistry laboratory** *JOURNAL OF CHEMICAL EDUCATION*
  Cox, C. T., Cooper, M. M.
  2006; 83 (1): 99-100

PRESENTATIONS

- Introducing Stanford Freshman to Science Writing Through Calibrated Peer Review - 22nd Biennial Conference on Chemical Education (7/1/2012)
- Designing a New Framework for Teaching Scientific Writing within Analytical Chemistry - 242nd meeting of the American Chemical Society (August 30, 2011)
- Incorporating Peer-Review Assignments into a Large Enrollment Freshman Chemistry Course - 249th meeting of the American Chemical Society (March 26, 2015)
- Developing a Safety Synergy in the Department of Chemistry at Stanford University - 249th meeting of the American Chemical Society (March 24, 2015)