



## University of Michigan Provost's Teaching Innovation Prize

2016 WINNER



### BRIAN P. COPPOLA & RECENT CSIE|UM PARTICIPANTS

Department of Chemistry faculty pictured:  
BRIAN P. COPPOLA, EITAN GEVA,  
ROSEANNE SENSION, and JOHN WOLFE  
Department of Chemistry postdoc pictured:  
BEN JENNINGS

Department of Chemistry students pictured:  
ALLISON MILEN, NICHOLAS MILLER, MICHAEL PAYNE,  
ALICIA WELDEN, BLAIR WINOGRAD, and AMBER YOUNG  
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# Improving Instruction and Nurturing Future Science Educators

## Innovation Description

Launched in 2014, the Chemical Sciences at the Interface of Education (CSIE|UM) program models a way to institutionalize faculty-led engagement in instructional development throughout a department. Faculty form teaching groups (analogous to research groups) supported by internal funding and the administrative leadership of a new Associate Chair for Educational Development and Practice. In turn, the teaching groups bring together undergraduate students, graduate students, and postdoctoral associates to undertake meaningful projects that also develop their professional skills. Below are some of the creative opportunities for chemists who are passionate about both research and teaching:

- Future Faculty GSI (FFGSI) appointments redirect 10 hours per week from teaching responsibilities to an education project.
- “Dual mentorship” postdoctoral associates teach as a lecturer one-third of the year while continuing with their research group.
- Undergraduate Structured Study Group (SSG) leaders co-design and fully implement the instructional program for Honors sections in several introductory courses.
- Students lead the organizing committee that initiates CSIE|UM programming, including an annual symposium.

Institutionalizing CSIE|UM delivers a clear and coherent message that formal work in education is not the hobby of an exceptional few, but a goal to pursue alongside other scholarly activities.

<https://sites.lsa.umich.edu/csie-um>

Coppola, B. P. (2016, May-June). Broad & capacious: A new norm for instructional development in a research setting. *Change: The Magazine of Higher Learning*.

## Former SSG Leaders' Comments

*The Structured Study Group (SSG) experience “taught us to be critical, creative, engaged, and ethical scientists.”*

*“First-semester organic, Chem 210 jumpstarted my career [due to] the quantity and variety of learning resources and the manner in which coursework facilitated intellectual exchange among students.”*

*“Opportunities to teach as an undergraduate made me aware of areas that I needed to improve upon early in my teaching career and provided a support system through which these issues could be discussed and addressed.”*

*“SSG was our first encounter with true peer review and peer-to-peer education in an ‘art studio’ format with rigorous constructive critique and communication of knowledge.”*

*“Our focus on ‘students as teachers’ and data display was directly inspired by SSG coursework.”*

*Confronting research science as “the real thing” stoked our enthusiasm and was outstanding preparation for graduate school and beyond.”*

*“CSIE|UM is going viral; I am not alone in replicating parts of the program that work at my institution, and now my own students are having the same success that I did.”*

## Examples of Teaching Innovation

Course	Faculty Leaders	Education Project Title & Examples of Funded Graduate Student Work
125/126	Kerri Pratt	Incorporating Snow Chemistry Research <ul style="list-style-type: none"><li>• Design &amp; implement experiments related to research (Arctic sea ice loss; winter road salt)</li><li>• Create lab worksheets &amp; other class materials</li><li>• Expose students to original research to develop critical thinking, writing, and presentation skills</li></ul>
130	Julie Biteen Bart Bartlett	*Atoms First* Approach to General Chemistry <ul style="list-style-type: none"><li>• Select chapters for customized textbook and work with publisher to match online homework to new approach and content</li><li>• Examine &amp; rearrange Video Solutions website developed by former graduate students</li></ul>
230	Amy Gottfried	Developing New, Flexible Instructional Materials <ul style="list-style-type: none"><li>• Reformulate lectures, homework, discussion, and practice exams to partially flip classroom</li></ul>
230/260	Eitan Geva	Development of interactive computer demos for undergraduate physical chemistry courses <ul style="list-style-type: none"><li>• Expand demos to thermodynamics and kinetics</li><li>• Structure demos as problem sets that can be incorporated into homework assignments and in-class active learning exercises</li></ul>
260 Honors Studio	Dominika Zgid	Demonstrations and In-Class Experiments for “Real World” Chemistry <ul style="list-style-type: none"><li>• Develop demos and experiments that help students visualize challenging concepts and connect them to the real world</li></ul>
262	Roseanne Sension	Introducing Symbolic & Numerical “Computer Math” <ul style="list-style-type: none"><li>• Develop and test one Matlab exercise per week (12 total) that will enable students to dig deeper in homework problems</li></ul>
352	Kathleen Nolte	Incorporating Inquiry-Driven Experimentation in Undergraduate Biochemical Laboratories <ul style="list-style-type: none"><li>• Implement 2-week module centered on student-driven exploration and group-meeting style discussion of biochemistry techniques for evaluating frequency of non-coding DNA inserts in human populations</li></ul>
REBUILD	Anne McNeil John Wolfe Brian Coppola	Aligning Instruction, Learning and Testing <ul style="list-style-type: none"><li>• Carry out focus groups with undergraduates, graduates, and faculty about students’ use of resources throughout entire undergraduate program</li></ul>

Education projects concurrently under way in winter, spring, and summer 2016.  
Faculty propose about 20 projects each semester.



Chemical Sciences at the Interface of Education at the  
University of Michigan