I teach science because of the satisfaction of seeing students grapple with questions that interest and inspire them, the excitement of encouraging students to see the amazing beauty of science around them in the world, and the joy of engaging with students to discuss new research and the questions that are still to be asked. Their excitement is contagious. My goal is that students in my courses, as well as those participating in research with me, will gain their own excitement for asking and answering great questions! Given freedom with exciting scientific questions, students engage in more than the course or research topic; they connect with the rest of the world, integrating ethics, statistics, data science, economics, current news and more together with biology. To advance this goal, rather than approaching topics with an eye toward rote memorization, I encourage students to ask, “How do we know what we know?”

**I ask students to explore great questions.** (or, How do we know what we know, scientifically?) Exploring questions, students (and scientists) can see examples of how others have approached topics, and they can practice solving problems themselves. I organize students to work in community to solve problems based on challenging content, often drawn directly from published research. For example, after covering the effects of DNA methylation on gene expression, I asked genetics students to consider research describing the effect of Bisphenol A (BPA) on DNA methylation in mice. In addition to the research findings, we discussed our own extensive exposure to BPA and the possible impacts on our own DNA and our lives.

A key part of learning what we know as scientists is through data interpretation, so students need practice visualizing and drawing conclusions from data. In my plant physiology course, upper-level students design and perform photosynthesis measurements on a variety of plants. Using R to do the data analysis and graphing, students were able to draw conclusions – later supported by a literature search – about the growth of shaded plants, which they had not predicted from prior knowledge.

Doing research with undergraduate students is as much about teaching as it is about science. By providing students the scientific tools they need to start a creative exploration of questions on their own, I’m often gratified by student researchers’ visions of our project. During summer 2015, a sophomore student in my lab took the initiative to perform the chemical synthesis of a novel fluorescent molecule, so that he could research a question not answerable with the commercially available tools. In order to fully explore the question at hand, he pushed the bounds of his scientific skill set.

**I ask students to reflect on their learning.** (or, How do we know what we know, metacognitively?) I challenge students to consider and prepare information for audiences outside the academic environment, in order to give them experience with teaching, and also to allow them to consider how they learn and what others might need. As an example, working in groups, genetics students compose a short policy memo to an audience of their choice, arguing their position or opinion with supported facts. The policy memos are completed in three drafts with two episodes of peer review, and are typically a piece of writing of which students can be very proud. This project engages students because their reflection on learning is not simply internal; it relates the in-class learning experiences with real-world issues and consequences.
As a postdoctoral fellow, I worked with undergraduates to develop and teach several lessons for a 7th-grade science classroom. During Fall 2015, I asked my plant physiology students to follow a similar path: in planning a lesson for their own classmates, the students reflected on their own knowledge. They considered the content, learning goals, and assessments that would best help others learn the material. In addition to compiling the lesson’s components, each student prepared questions on the topic for their classmates, some of which were used during the exam. I was gratified to see students deeply engage with the new and challenging material in their role as instructor. Altogether, this practice of reflecting on their own and others’ learning is a great way for students to ask themselves, ‘How do I know if I really understand a topic?’

I explore and reflect, as well. (or, How do I know what I know, pedagogically?) I am continuously checking and revising my teaching because science is always evolving, and so are ideas about education. To reflect on and improve my teaching practices, I’ve participated in professional development programs at Trinity College and Macalester College, at the University of California-Davis, and through the Delta Program for Scientific Teaching at the University of Wisconsin-Madison.

I am excited to teach and learn alongside the students and faculty members at Trinity College. I currently teach Recombinant DNA Technology (BIOL226), the introductory Cellular Basis of Life (BIOL183), and the capstone course Stressed Out: How Plants Respond to their Stressful Environments (BIOL434). I am also interested in expanding my teaching proficiency by developing new courses, such as a Genomics and Bioinformatics lab course where students practice strategies to answer questions that have not been addressed with previous technologies, including performing whole genome-scale analysis of transcriptome data to answer conservation-scale questions. I will also be teaching a non-majors course called GMOs: Friend or Foe?, a non-lab course called Medicinal Plant Biology, and a Group II course called Plant Molecular Physiology, including a lab.

In each course, I find it important to reflect on and listen to the different contributions of the students present. During my time at the University of California, I had the opportunity to mentor a number of Davis-area high school and community college students with varied backgrounds and training experiences in biology. With interests as diverse as Psychology, Nursing, and Computer Science, these students often did not share a common language to talk about science. Whether learning about biostatistics, science fair projects, or plant growth, the students challenged me to reflect on and expand my habits and vocabulary in speaking about science, incorporating analogies and current examples. It was extremely gratifying to watch each of the students expand their own skills in communicating and practicing science with one another and with instructors. I built on those mentoring experiences while at Macalester College, as many students in introductory biology courses have career interests outside natural sciences altogether. As I move forward at Trinity College, I believe that including a diversity of students in discussions about biology brings unique perspectives to the table, enriching the experience not only for students but for me as the instructor as well.