My philosophy of teaching, based on a large body of literature on the psychology of learning, focuses on active learning. Active learning is putting the information out, as opposed to taking the information in (which is passive learning). Example of active learning include drawing a diagram or explaining a concept to a peer. As Rosemary Haggett, former Director of the National Science Foundation Undergraduate Education Division said at the Council for Undergraduate Research dialogues, my goal is to be “not the sage on the stage, but the guide on the side.”

In the sciences some of the best opportunities for teaching thinking come in the laboratory. In my courses for majors, I seek to make the labs experimental, as opposed to merely observational.Students are given a little freedom in the experimental design, within the framework of available materials. For all courses, the goal is to offer students a laboratory experience that allows them to learn the process of science by actually doing science (i.e., Course-based Undergraduate Research Experiences, or CUREs). This includes designing experiments, collecting data, and writing a report in scientific format. Student-designed labs take students out of their comfort zone. Therefore, this creates an opportunity for academic development.

In our physiology courses, I have created project-based labs, in which teams of three students learn an experimental system, develop a prospectus for their own experiment, then conduct and report on that experiment. As one example, all ectothermic animals (e.g., cold blooded animals like insects) experience Chill Coma when cooled below Low Critical Temperature. Their neuromuscular system fails to function without sufficient external heat. When returned to warm temperatures, they eventually begin to move again. This Chill Coma Recovery is easily observed. It is also affected by many previous conditions, such as pre-chill or dietary ion levels. This is an inexpensive, manipulable system that allows students at a state college with budget limitations to conduct real science in a regular class.

My favorite lecture teaching has always been discussion courses. The Biology of Aging course, despite being ~25 students, is taught partly as a seminar. The first 35 minutes of each class meeting are lecture, where I provide the basic background on the current topic. The second 40 minutes of each class meeting is a discussion with ~12 students on a primary paper. Students are assigned specific roles in the discussion: Context expert, Methods expert, Advocate, and Devil’s Advocate. Each primary paper is discussed for two days: the first day focuses on understanding, and the second day focuses on evaluating the paper. The contents of these discussions are integrated in the course exams. In other words, despite teaching at a state university with larger class sizes, I use a seminar format when possible.