STATEMENT OF TEACHING PHILOSOPHY – CASEY D. BURLEYSON

GOALS AND TECHNIQUES

My primary goals as a science educator are to cultivate in students an excitement about and comfort with science; to develop their ability to think critically and solve complex problems; and to create the skills necessary to learn independently outside of the classroom. Science education should foster three distinct skill sets:

1) Inquiry – Students should be able to pose insightful questions and design analyses to investigate things they do not understand.
2) Analysis – Students should be able to methodically confront challenging problems using a variety of approaches.
3) Communication – Students should be able to clearly and effectively communicate with their peers as well as with the general public.

Each of these skills relies on a strong foundational knowledge of meteorology. Science education builds on itself both in the short run (over the course of a single class) and in the long run (over the years of undergraduate and graduate education). A scaffolding approach to knowledge creation, whereby I start with simple principles and, once I am sure they are understood, slowly build to more difficult concepts, is effective on both time scales. For introductory students, this approach ensures that they master the material before moving on to higher-level courses (i.e., the next level of the scaffold) while for upper-level students this approach reveals how certain concepts fit together in a bigger picture (i.e., the whole structure) which leads to a deeper and more permanent understanding.

The teaching method for each course, section, and topic must be dictated by which approach has the highest likelihood of helping the students learn. It has been my experience that using a range of approaches aimed at different learning styles and abilities as well as multiple checkpoints to assess comprehension is the best way to effectively teach. The combination of frequent assessments and iterative adjustments allows me to tailor my teaching methods for varying groups of students and a diverse student population, including those with which I have limited previous experience. I use a student-centered, interactive approach where the students are involved in the delivery of material. I mix lecturing, student-led discussions, problem-solving time, and peer-teaching in different combinations for each class period. In my experience active learning exercises can initially be uncomfortable for some students because they require them to step out of their comfort zone and engage in class. However, I have found that better attitudes and more participation occur when I take the time to explain why I am doing something other than pure lecture and how they will benefit from it.

PRINCIPLES OF TEACHING

Set clearly defined expectations. Students have the right to know what is expected of them. I use learning objectives at the beginning of every class to define what the students should be able to do after that unit. The learning objectives contain action verbs such as define, explain, relate, or predict that clearly communicate the depth of knowledge expected.

Have the students buy into the class. Students are more committed to a course when they believe that the material covered and their effort will directly benefit them. This can be facilitated by relating course material to real-world applications. In the non-major introductory course I taught, I often discussed non-meteorological applications of weather and climate science (for example, how businesses can respond to changing weather conditions by varying their stocking or pricing strategies). Along similar lines, I bring observational data sets from field campaigns into upper-level undergraduate and graduate meteorology courses and labs. This approach provides the students with hands-on experience with real data. Analysis of actual meteorological data sets is a way to directly connect theory to application in the classroom.

Let the students make mistakes. Students should be challenged in the classroom. As such, they should not always get it right on the first try. Just as learning why an experiment failed can be more valuable than immediate success, making mistakes in the classroom can be beneficial. Having students understand why an answer is incorrect leads to a more permanent understanding compared to simple memorization of the right answer, and having the students work to investigate flaws with a wrong answer is a useful method for developing scientific inquiry skills.

Assess student learning frequently. The biggest problems in my teaching career have come when it appears the students understand something when really they are lost. Material builds rapidly in meteorology. If students did not understand latent heat release in week two, then it is unlikely they will comprehend the differences in dry and moist adiabatic lapse rates in week four. Frequent assessments make it clear where knowledge and expectations have diverged. Assessments can be formal graded activities, such as quizzes and exams, or quick in-class polling questions and think-pair-share activities.

Listen and respond to student concerns. All students learn and approach courses differently (for example, undergraduate vs. graduate students, majors vs. non-majors, or traditional vs. non-traditional students). If my approach in a particular course is limiting the ability of my students to learn, I should be prepared to change direction and better tailor my methods for that group of students. Short daily writing assignments and in-semester informal evaluations are useful tools for students to provide feedback that allows me to proactively respond to their concerns.