Teaching Statement – Jaclyn Brown

I fell in love with oceanography for its mathematical beauty. In my teaching, I encourage students to become confident with using mathematics to understand how the oceans and climate work. As you can see from my CV, I have a diverse teaching background developed from teaching in high schools, universities and the wider community. I am often told that I am an engaging and effective teacher and communicator.

My students have come from varied backgrounds, both educationally and culturally and so it is important to be aware of, and adapt to, these and other differences. As a result of my exposure to different audiences I have encountered many styles of learning. Most importantly, I found that learning is more likely to be effective when it is contextually based. Students must be able to connect what they are taught to their experience and knowledge. Ideally, the classroom dynamic should be one in which the students feel in control and take ownership of their learning, guided by the teacher. This is particularly so for small classes of graduate students, who have specific needs and goals. Thus in the material below I outline a discussion of my experiences in the classroom and how they relate to these key themes.

As an undergraduate I elected to take several education courses. My motivation for taking these classes was to not only to improve my own learning skills but also to become an effective teacher. As a result, I learned important pedagogical theory: for example, effective ways to present information for learning to occur, the importance of linking new knowledge with that already known, and how to assess when learning has occurred

For several years I worked as a tutor at the University of New South Wales. This involved teaching classes of around 30 undergraduates a few times each week. The topics I covered included linear algebra and vector spaces, complex numbers, and ordinary differential equations. This opportunity allowed me to refine my mathematical skills and also to develop my communication skills. Practical experience in the classroom helped me develop skills such as classroom behavior management, teaching to a wide range of ability levels, and balancing my own research with the demands of the classroom.

My skills were further developed when the University of New South Wales introduced a new course called “Professional Issues and Ethics in Mathematics” for which I went on to be a tutor for. The goal of the course was to address industry criticism that graduate students were not appropriately equipped for the workforce, particularly their presentation and writing skills. I took small classes and helped students develop their presentation skills including selecting content, presenting complex material clearly, organization, and how to be emotionally comfortable when speaking in public.

A further example which incorporates my ideals of teaching occurred when teaching introductory classes on global warming in local high schools. I first discovered the students knowledge base through class discussions, then

encouraged them to lead the class by coming up with their own solutions and thoughts on the problem. I quickly learned to become flexible as a teacher, as spontaneous discussions would emerge on topics such as, “Why don’t we ban cars?” leading on to deeper concepts of systems dynamics.

These lessons were also beneficial as I tried to improve my ability to learn in my PhD studies. I felt that it was a shame that I was working in an oceanographic institute but did not get many opportunities to talk to the researchers about their work. In addition, I noticed that like other students, I was too intimidated in seminars to ask questions. This inspired me to start and coordinate a “student only” seminar series, to which resident and visiting scientists were invited to give lectures to graduate students. We developed a safe and supportive environment, in which we all felt we could ask “dumb questions” of the lecturer. These lectures were successful in broadening my scientific knowledge. As a result, the graduate students began to help and support each other. We were not only able to make links between the new information and our experiences, we were also able to connect with the projects of other students and benefit from their understanding. The learning process was all the more enjoyable and effective. Additionally we developed collaborative skills essential to later work in scientific research teams.

This year at Yale University I have enjoyed giving a few fill-in graduate lectures in the Theory of Climate and Physical Oceanography. The lectures included discussions of El Niño, the Indian Ocean Dipole and Monsoons. Because I believe that oceanography and climate should not be studied in isolation from the rest of the world I wanted to be able to connect abstract theory and application. For example, in one class on El Niño, I arranged for one of the more outgoing students to role play an Australian farmer. (also wearing the appropriate Australian farming hat). As we discussed different methods of modeling and forecasting El Niño we also considered how useful each was to the farmer making crop decisions. Further we discussed what sort of research was needed to help the farmer plan for drought and what the scientific limitations are, e.g. Chaos theory and the limitations of climate models.

I look forward to teaching courses in Physical Oceanography and Climate Change. One such course I would be keen to teach is Data Analysis in Oceanography and Climate. I took a similar course and found that I refer to it endlessly in my day-to-day work. Such a subject is an important bridge from the theory of classes to becoming an independent scientist and typical statistics courses are not always relevant to ocean, atmosphere and climate studies. It is extremely important that students develop their own toolkit of statistical approaches and have the confidence to apply them. I would envision that this class be based on practical assignments where the students are given data sets and asked to use a common mathematical program such as Matlab or Ferret to analyze and interpret the results. Such experiential learning develops skills using computational software, cements understanding of the topic and provides examples for students to later reference when they need to use the tools again.

The course could begin with very simple ideas such as correlations and confidence intervals, developing further into Fourier Analysis, aliasing and filters and finally interpreting climate data with tools such as EOFs, discussing the associated flaws in the methods. At all times real life examples would be incorporated for how these methods are used in understanding phenomena such as ENSO. One project could be to separate the seasonal and interannual cycle of wind and SST in the tropical Pacific and explain how the two interact, including any lag relationships. Where possible this could be connected with theory developed in previous classes on oceanic Kelvin and Rossby waves. For the more advanced students, the ability to create scientific questions and design appropriate statistical tests could be honed.

As you can see from my CV I have a strong and varied teaching background, including television presenting, and teaching high school and adult education classes. My experience in Climate Dynamics, Physical Oceanography and Computational Fluid Dynamics gives me confidence that I could effectively teach many subjects.