Graham Coop

Statement of teaching philosophy and experience.

Throughout my career I have been inspired by great teachers and this had a strong impact on my choice of vocation. It is very important to me that I pass on my enthusiasm to my students. I see it as a vital part of my work to use science to teach critical thinking, which regardless of where students go after they graduate, is an increasingly important skill in society today.

During my time at the University of California, Davis I have taught at both undergraduate and graduate levels. I thoroughly enjoy teaching and I have invested a lot of time in the development of my courses. In preparing these courses I have spent a good deal of time finding my own examples to illustrate concepts and my own path through the material, rather than just relying on the textbook. I still have a lot of room for improvement, particularly in engaging large classes, but I am happy to invest the time as I see teaching and course development as iterative processes.

Quantitative skills and thinking are increasingly a part of many fields of biology and indeed of life in general. Coming from a background in physics I see integrating mathematical problem solving throughout the biology curriculum as a particularly pressing need. Evolutionary biology in particular offers a great way to reinforce quantitative thinking as so much of our understanding of the time-scales and the dynamics of evolution are informed by basic mathematical models.

At the introductory level I can teach Evolutionary biology, Genetics, or Human Genetics. At the advanced undergraduate level I could teach courses on population, statistical and evolutionary genetics and molecular evolution. I am also keen to developing courses on the use of mathematical modeling and programming, as applied in human genetics and evolutionary biology, and to help spread the use of simple programming and math to other courses. Working in human population genomics I am very aware of the shortfall of the public's understanding of the implications of the genomics revolution for society. As such I am interested in creating a non-major course on the coming impact of personal genomics on our understanding of disease, ancestry and race.

Current teaching. At Davis I teach a large enrollment undergraduate class called an Introduction to Evolution (EVE100). In developing this course I have strived to introduce the students to a wide-spectrum of evolutionary concepts and more generally to encourage evolutionary thinking. The students are assigned a number of original recent research papers, as I think it important for them to be exposed to this primary material. Throughout the course I highlight the quantitative underpinnings of evolutionary thinking, and use word problems to build the students' confidence with applying these ideas. I also concentrate on bringing material from my own research on human evolution into the class. This last year I was genotyped by the company 23&me, and I have been working to integrate the use of my own genetic information into the class, e.g. using my own genetically

predicted BMI to illustrate the influence of genetics and the environment on a quantitative trait.

I also teach a graduate level course on population and evolutionary genetics (PB200A). I designed this course to give students a practical understanding of the implications of population genetics and genomics for their own future research programs. Throughout the course I have developed a set of programming exercises in the statistical program R to teach the students some basic computational skills and to improve their intuition for the math. I'm posting these simulation tools to http://gcbias.org/ to allow others to make use of these in their classes. Both of my undergraduate and graduate courses are well received by students (most recent teaching evaluations EVE100: 4.14/5.0 and PB200A 4.57/5.0).

Mentoring. One of the greatest pleasures of my job is working alongside bright postdocs and graduate students. I enjoy helping them develop research programs that suit their individual strengths and interests. Since I arrived at UC Davis I have mentored two postdoctoral fellows. Peter Ralph joined the lab in 2009 from a PhD in Stochastic Processes at UC Berkeley, and was awarded an NIH NRSA postdoctoral fellowship this year. Yaniv Brandvain came to Davis in 2010 from a PhD in Evolutionary Biology at the University of Indiana and has been awarded a NSF postdoctoral fellowship in Biology. I co-advise a PhD student, Alisa Sedgifar. Alisa is an Iranian-Japanese student who came to us from the University of Melbourne, where she completed a double-majored in Mathematics and Biology. Alisa was awarded an NSF predoctoral fellowship last year to support her graduate studies.