TEACHING STATEMENT

Kenneth O. Stanley

My teaching philosophy has developed over several years of teaching and supervising students. First, from 1997 to 2000, I taught Foundations of Computer Science under the supervision of Prof. Gordon Novak. This class introduced fundamental topics such as iteration and recursion to first year students entering the major. I gained significant lecturing experience by holding weekly discussion sections for two 25-student sections. For this work, I received a Teaching Assistant Service Commendation in December of 1999. Second, in 1998, I took an eight-hour supplemental instructor course on methods for teaching study techniques, and put this knowledge to practice over the following two years of teaching. Third, in 2001–2004, I co-supervised (with Prof. Miikkulainen) four senior undergraduate students pursuing research with the NEAT method and coordinated a team of over a dozen undergraduate programmers for the NERO project. The combined experience of teaching and supervising students at both beginning and senior levels has helped me develop a flexible and practical teaching philosophy.

My experience has taught me that a delicate balance must be struck between teaching new material and teaching how to learn new material. On one hand, there is usually a great deal of material and insufficient time to cover it. On the other, learning can be accelerated if students are taught to approach material in a productive manner. I believe that understanding the student’s perspective is an important factor in effective teaching. Thus, I take into account both the learner and the course material when I plan lectures. When I introduce challenging concepts, I explain to students how they can be integrated into the overall framework of the discipline. Introducing material in this way helps students relate to the teacher and envision their own mastery of the material.

Students also need an outlet for creativity. Too often students come to feel that computer science is a restrictive discipline of established algorithms, data structures, and applications. For example, my own fascination with computers derives from the freedom they give me to create, rather than from the regimented practice of prescripted exercises. Moreover, in informal conversations with my students, they invariably want to tell me about their ideas, for which they convey genuine enthusiasm rarely displayed in a class setting. I want to show students that computer science is indeed fueled by original ideas. Thus, I will frame class exercises in a way that allows them to express themselves individually, as well as demonstrate mastery of the material.

I would like to put together a new course, both at the undergraduate and graduate levels, at the intersection of computational biology and machine learning. In these courses, I will combine topics in reinforcement learning, machine learning, genetic algorithms, artificial neural networks, and complexification, with neuroscience and evolutionary biology. In particular, I will focus on powerful unexploited biological metaphors, such as synaptic plasticity as the basis for adaptation and gene reuse as a crucial contributor to effective encoding. My courses will produce students with a unique perspective on learning and intelligence, integrating both biology and computation. I expect exciting new ideas to emerge from class projects since many topics covered will be at the cutting edge.

Finally, I plan to devote considerable time to supervising both undergraduate and graduate research. My courses will serve as an entry point into my research agenda. I will offer an explicit and expanding list of topics, ranging from short-term one semester projects, such as evolving a controller for a specific task, to long-term dissertation topics, such as combining complexification with an indirect genetic encoding. In supervising students, I have found detailed one-on-one discussions with motivated students particularly useful, and I will continue this practice as an advisor and mentor. I will make myself available regularly to discuss continuing research and help students overcome obstacles in their work. In addition, I will encourage the spread of ideas through regular research group meetings. Such a peer group facilitates constructive
feedback, creative brainstorming, and intellectual support for both senior and junior students. I believe a well-coordinated group of strong and creative minds is a highly productive environment for beginning researchers, and I will make forming such a group a high priority in my student supervisory agenda.