Teaching Statement
Ashraf Khalil

Teaching Philosophy

My high school experience with computer science and science classes in general was very negative. I could not grasp the meaning of the subject material I was taught and just memorized rules, formulas, and code in order to pass exams, usually with low grades. I could not understand the point of most class lessons and failed to grasp an overall perspective of how different topics fit into the bigger picture. Thanks, however, to a great computer science teacher in my last year of high school, I found myself at a transition point where things started to make sense. For the first time, I enjoyed my computer and science classes. My computer skills improved, and I began to view computers as a fascinating field of study that demanded the same skills needed for other types of science such as math and physics. From this experience, I gained a great appreciation for the lasting impact of an extraordinary teacher. Moreover, it greatly motivated me to become a better teacher and contribute to an improved educational system. Universities offer a unique opportunity to make a difference because they are the places to train the future generation of teachers. This was one of my main motivations in pursuing an academic rather than an industrial career.

Distinct from a computer professional, a computer scientist has a heightened understanding of the theoretical considerations behind many different computers and computations, approaches to a wide variety of real life computer problems, and the direction computation will take in the near future. A quality computer science education must not focus simply upon instruction in programming languages, but also upon the principles of sound engineering and upon analytical measures of the impact of various computational techniques upon problem-solving. The field of computer science is constantly changing; thus it is essential to move beyond specific languages to focus on critical thinking and problem-solving techniques.

The process of learning, I believe, depends primarily on the students themselves. A teacher's role is not to spell out every detail to the students, because doing so may curb their creativity and self-motivation. Instead, a teacher should facilitate students' ability to effectively use and absorb the course material, should urge the students to observe closely and discover the relationships between the different concepts taught in class, and should help them build their own ways of learning and thinking. When teaching a course, my goals for students are fourfold: upon completing my course, they should (1) have gained pertinent skills to use in their future careers, (2) know how to apply these skills to solve real life problems, (3) know how course topics relate to other topics in computer science and related fields, and (4) know how to critically study materials to understand the foundations and assumptions upon which they are based.

At the graduate level, it is also vital to impart the ability to critically examine real research problems relevant to the course. Through the use of course projects and publications, students must be made aware of the importance of current research. To a greater degree than in undergraduate courses, educators at the graduate level must create an atmosphere which allows for group discussion and collaboration in the learning process. Such an atmosphere not only allows students to explore course subjects to the best of their ability, but also builds the students' confidence in their ability to critically review and propose new research problems and solutions and to judge their significance to the field.

I strongly believe that my experience in research is essential to assisting students in learning to explore a problem when they have no intuition of its solution. Through my experience, I have always found a good teacher to be a good researcher as well. Teaching is a process of self-

improvement not only for the students, but even more so for the teachers. Interaction with students lends me new perspectives on the material we discuss.

In the several undergraduate level courses in which I have served as an associate instructor at Indiana University, I have found it more effective to use guiding questions, rather than demonstrations, that help students to organize the skills taught in class into real solutions. In addition, my experience in teaching operating systems and networking has shown me that the use of real life problems in examples and in class projects is particularly important as they not only assist students in applying their knowledge, they also increase students' interest and enhance their appreciation of the course. My preferred teaching approach consists of weekly lectures, weekly reading material, one or two exams and a hands-on class projects requiring a final report and class presentation. I encourage students to participate in weekly lectures by assigning readings as well as written summaries of the readings. Class projects are essential to computer science courses; they provide an opportunity to apply concepts learned in class and implement research ideas. At times, these projects may even result in new research leading to publishable work. When teaching I would also like to emphasize the importance of strong written and oral communication skills. Class presentations and written reports are the keys to developing these skills. In summary, I believe that teaching must not only focus on learning the course material at hand, but also on teaching the students to think independently and develop the many skills we all need to succeed in this competitive world.

Teaching Experience

At Indiana University I have had the opportunity to serve as an associate instructor for 6 different classes at different levels over a period of 4 years including summer sessions. In fact, most semesters, I opted to work as an associate instructor rather than as a research assistant to gain more teaching experience and do what I enjoy most. The classes I have taught represent a wide range of topics and skills: Introduction to Computers, Java Programming for non-majors, Advanced Java Programming for computer science majors, Operating Systems, Distributed Computing, Computer Networking and System Administration for non-majors, and Advanced Computer Networks. My responsibilities included leading laboratory and discussion sessions, designing homework projects and class materials, grading and running office hours. These responsibilities, in addition to the fact that I have taught at all levels from freshman through graduate, have provided me with a very valuable and rewarding experience.

I am qualified to teach typical computer science and computer engineering classes as well as basic mathematics and physics courses. My areas of particular strength include computer architecture, operating systems, algorithms, database and data retrieval, telecommunications and networks, and mobile and distributed systems. I am also interested in teaching undergraduate level courses in discrete mathematics and mobile programming and graduate level courses in the new and emerging field of pervasive and ubiquitous computing. I have ample experience in dealing with these topics through my own research in ubiquitous computing and systems as well as through my teaching experience.

I believe I have both the motivation and the experience to make a significant contribution to an ever-improving educational system. The diversity of my academic experience and my interpersonal skills in working with all levels of students and faculty have well equipped me to thrive at a higher level of university teaching and research.