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This interview was conducted with Dr. James Ward, who is currently my Calculus Professor. Dr. Ward has been associated with UAB and research for the past 20 years; his efforts have provided many insights in mathematical concepts. I had the opportunity to discuss his career interests as a faculty member and what suggestions he has to offer potential undergraduates passionate to pursue a future occupation in any form of research.

Q) How did you become interested in research?

A) Research is a way of learning about the world, a way of finding what is true. It is also a way of living. I had been interested in mathematics and science even as a child. Of course, family influences played a role. My family often engaged in philosophical discussions and debates, and this encouraged analytic thinking and openness to new ideas. By the time I went to college, I was interested in mathematics, science, literature, and philosophy. But mathematics had a special appeal to me. After taking calculus, I was advised to take a topology course in my sophomore year. Topology is a subject concerned with very general, abstract, notions related to geometry and calculus. In the course we, the students, were given mimeographed notes containing only definitions and statements of theorems. Our job was to prove the theorems. If someone found, or thought they found, a proof, they would present it to the class. That was the whole course; there were no lectures, no books, so it was like doing mathematics research. I loved it and would spend hours, even days, working on a single question. Here at UAB our Advanced Calculus course is run in much the same way. After that topology course, I was pretty sure I wanted to be a mathematician. My advisor, Dr. Jack Roth, who taught me topology, abstract algebra, logic and foundations of mathematics, also influenced me. He was a remarkable man, both a mathematician and an award winning artist. I think mathematics, science and the arts are complementary, and Jack Roth exemplified that. He encouraged my further studies in mathematics. Later, in graduate school and after, there were other influences and a particular direction for my research.

Q) Where did you do your undergraduate and graduate studies?

A) University of South Florida

Q) How long have you been at UAB, and what persuaded you to come here?

A) I have been here since 1989, and before that I was at the University of Alabama. While at Tuscaloosa, I had a lot of contact with the mathematics department at UAB. UAB seemed to offer an excellent atmosphere for my research, which is in nonlinear analysis and differential equations, by having faculty with similar research interests. In addition, the people in the mathematics department were very intent on building a strong research department to attract good students. I think we have succeeded in that goal.

Q) Please give a basic description of your current research interests/projects?

A) Much of my work has been in non-linear analysis and differential equations and how solutions relate to the structure of the equations. Another interest of mine is in bifurcation theory. A system exhibits a bifurcation if the type or number solutions change as a parameter changes. For example, a stable equilibrium state might suddenly lose stability, with the stability transferred to another, new, equilibrium, or even to a periodic solution. Bifurcation phenomena are observed in physics, chemistry, and biology, especially physiology, and elsewhere. For example, the bending of a beam under a force and the firing of a neuron are bifurcation phenomena. Topological notions are fundamental in the study of bifurcation and nonlinear equations. Thus my early training in topology probably helped! For the past several years, I have been working with some excellent Chilean mathematicians, Raul Manasevich and Marta Garcia-Huidobro, on some problems involving nonlinear differential equations and bifurcation. Recently we decided to look at some mathematical modeling questions in biology and sociology, so that is a new direction.

Q) Have you ever worked with undergraduates?

A) Yes, I have often worked with mathematics fast-track students at UAB.

Q) What advice would you give to undergraduates considering research activities both now and later as a career?

A) Take the initiative. Do lots of outside reading in your subject and related areas. Find other students with similar interests. Make your interests known to your professors and adviser. The UAB science and mathematics faculty are generally very open to working with undergraduates. It may also help to get involved with seminars. Ideally, the student should be seriously interested in the subject and shouldn't be doing something just for credentials.