

Meet Physics Department Alumnus

David Morton, Ph.D. *Stetson Class of 1987*



Biography:

David Morton graduated from Stetson University with a B.S. (1987) in Physics and Mathematics and from Stanford University with an M.S. (1990) and Ph.D. (1993) in Operations Research. He worked with the Pacific Gas and Electric Company on developing and implementing special purpose optimization algorithms for solving large-scale stochastic hydroelectric scheduling problems. Prior to joining the Operations Research faculty at the University of Texas at Austin, he spent two years at the Naval Postgraduate School, first as a National Research Council Postdoctoral Fellow and then as a Visiting Assistant Professor. He is the recipient of the Commemorative Medal of the Faculty of Mathematics and Physics of Charles University, a Fulbright Scholar Award, a National Science Foundation Presidential Early Career Award for Scientists and Engineers, the 1997 Rist Paper Prize, the 1994 George E. Nicholson Paper Prize, and was a finalist for the 1994 George B. Dantzig Dissertation Award.

His research interests are in developing applications, algorithms and theory for solving stochastic optimization models of complex systems that contain significant uncertainties. Solution procedures for such problems involve large-scale optimization techniques, bounding and approximation methods, and Monte Carlo sampling. He has interests in specific applications in water resources, finance, electric power systems, thermal system design, and smuggling interdiction.

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Open Letter to Stetson Physics Majors:

Last week I had the opportunity to return to Stetson and give an informal talk, over pizza, to current Physics majors at Stetson on “Graduate Studies Opportunities in Engineering.” It was wonderful to meet and talk with some of you, to catch up with Drs. Jusick and Lick, and to meet the new (okay, “new” since I graduated in 1987!) faculty members, Drs. Glander and Riggs.

During my visit I learned about some of the current research going on in physics at Stetson. I was impressed with the recent equipment acquisitions and purchases to support this research. I was especially impressed with the quality of the research and the high level of student participation via the SURE and REU research programs.

I came to Stetson from Columbus, Ohio in 1983 with a desire to enjoy a warmer climate and play more golf. (I played on Stetson’s golf team in my freshman and sophomore years.) However, I remember being drawn in by Dr. Lick’s PS-202 course in my freshman year and then very much enjoying Dr. Jusick’s PS-331/332 sequence as a sophomore. Over a decade later, I bought a new copy of the *Mathematical Methods in the Physical Sciences* textbook of Mary Boas as my copy from Stetson was in tatters from excessive use. I spent the summer after my sophomore year at the DOE’s Hanford Site in the state of Washington working on a nuclear physics project. My career as a golfer was over, and my interest in a research-oriented academic career began.

I also studied mathematics at Stetson as a double-major and now feel that the combination of physics and mathematics prepared me very well for a PhD program and research career in which technical (i.e., mathematical) rigor and the ability to figure out the key drivers of a system (regardless of whether the system is mathematical, physical, etc.) are paramount. As physics and mathematics majors at Stetson we derived results from basic principles and definitions, instead of flipping textbook pages in an attempt to find the correct formula to “plug into.” I still remember the day Dr. Lick told me that Newtonian mechanics could be derived from the single underlying *principle of least-action* (instead of Newton’s three laws) and that the least-action principle plays a central

role in the modern theory of physics. That this principle is closely tied to the calculus-of-variations method, which we had studied in PS-331/332, made it all the better.

After graduating from Stetson, I attended Stanford University and graduated with an MS and a PhD in Operations Research (OR) in 1993. After Stanford I did a two-year postdoc in the OR Department at the Naval Postgraduate School. Since 1995 I have been on the faculty of the Graduate Program in OR at The University of Texas at Austin (UT-Austin). The field I've entered is often called the *science of decision-making*. Looking back, my enjoyment of Dr. Jusick's "Math Methods" course pointed toward the career I enjoy today. These days, I devote about half of my research effort to developing mathematical methods for solving various types of optimization models. The other half of my research time is devoted to using (and improving) these methods in order to solve specific optimization models arising from a wide variety of applications including:

- designing a thermal enclosure,
- selecting an optimal investment portfolio,
- locating sensors to deter smuggling of sensitive nuclear material, and
- installing wells to control a groundwater contaminant plume.

Like the physics faculty at Stetson, I thoroughly enjoy working with students on solving research problems. I'll resist the temptation to "go on and on" regarding my research program and instead encourage you to take a look at my web page if you'd like to learn more.

In addition to working on research and teaching graduate and undergraduate courses, I've spent five years (until 2002) working as the "Graduate Student Recruiter" for the OR program at UT-Austin. So, if you would like to chat with me regarding graduate school opportunities in operations research or, more generally, in engineering and the sciences, feel free to send me an e-mail or give me a call.

This past year I've been on sabbatical, spending fall semester at Charles University in Prague doing research with Prof. Jitka Dupacova, who I met early in my graduate school career. During this spring semester, I am spending some time at the University of Central Florida working with Prof. Charles Reilly, who taught me my first course in OR, the summer after I graduated from Stetson (when he was still at Ohio State in Columbus). While I suppose it's obvious, it is always amazing to me the degree to which a few key professors, in their roles as mentors, advisers and colleagues, have influenced my career path. For this reason, you are most fortunate to be associated with a vibrant department whose faculty members play these roles with care and wisdom.

—David Morton

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