



SOCIETY OF ACTUARIES

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# Complexity Science Enters the Actuarial Classrooms

By Min Deng



Here, in the year 2011, we still expect our incoming actuarial science students to arrive with an excellent grasp of algebra and lots more of the traditional mathematics skills. They need those as background as we focus on the many actuarial subjects they will encounter in the Society of Actuaries' (SOA) exams. But in today's business environment, the actuarial subjects for the exams are, to borrow a phrase used often by mathematicians, "necessary; but not sufficient." Hence, we are supplementing them with complexity science techniques.

In both our undergraduate and our master's programs here at Maryville, we have brought in industry speakers who open our eyes to the world beyond deterministic equations, where the complex adaptive system we call humanity does not tend to meekly follow according to classical economic or actuarial theory. The primary focus, of course, for us still is making sure our SOA exam pass ratios remain very high, since those are a major advantage for our graduates in the tighter job market. But we also want our graduates to learn to keep an open mind to new tools and techniques that can benefit them and their employers in this dynamic marketplace.

We used to think chaos was something to avoid all the time. Now, we teach it! ▼

**M**any of us remember the days of being a student—when the dorm rooms were a visual example of what we thought was chaos. Now, chaos has moved into the classrooms as well. Of course, this is a different type; and it is welcome. Recently, in my classes at Maryville University's actuarial science program, we have brought deterministic chaos into our curriculum. And if that does not seem revolutionary enough, it's being joined by behavioral economics, fractal geometry, experimental mathematics, predictive modeling, network theory, genetic algorithms and cellular automata.

What are all these strange-sounding new topics doing in an actuarial science program? They are helping us prepare for the sciences and techniques of the 21<sup>st</sup> century. Stephen Wolfram, a MacArthur Genius Award winner, and an eminent and highly respected physicist, has said, "I expect that the children of 50 years from now will learn cellular automata before they learn algebra."



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