Regional

# The Mathematics of Life, Survival, and the "Goodness-of-Fit"

## Stephen Hansen
## College Talk

When you are born, what do you suppose the chances will be that you will reach age 5 or 65? How about 95? Zenia Agustin, a professor in the department of mathematics and statistics at Southern Illinois University Edwardsville, knows.

"Basically, I am interested in modeling the time to occurrence of certain events," she explained. Agustin studies and teaches statistical modeling called "goodness-of-fit," a way to predict certain kinds of events, like birth and life expectancy. "For example, we can statistically examine a repairable component so we can understand when and how many times it will fail. Or, in the case of a person, we can know the probably of recurrence of a disease. My interest is in finding a statistical model that makes use of all available information."

She said that her work deals very much with predictions – and the ability to make good ones. The goodness-of-fit test can help determine whether a model is feasible and whether or not it makes good predictions. For example, the kind of statistical model Agustin develops can tell an engineering firm how long it can expect a piece of machinery to work, which parts are likely to wear out first and how many times it can be repaired before it is better to buy a new one. The most obvious examples of Agustin's research impact insurance companies and pension firms, which need to know how long we are expected to live.

Agustin earned her undergraduate degree and master's degree in mathematics at the University of the Philippines, where she specialized in actuarial science. Actuarial science is the application of mathematics and statistics to assess risk. Insurance companies, financial firms, and most industry are all very interested in this kind of mathematics because it helps determine everything from when a piece of machinery might fail to when you should retire.

For the Intelligencer

Zenia Agustin, a professor in the department of mathematics and statistics at SIUE.

Agustin worked as an actuarial consultant for three years before deciding to immigrate to the United States to study at Bowling Green State University in Ohio. She quickly earned a second master's degree and a Ph.D. in mathematics and statistics. Agustin accepted a job offer from SIUE as soon as she received her Ph.D., nearly 18 years ago and has been here ever since.

"SIUE has given me opportunities to develop as a teacher, researcher and university citizen," she said, explaining why she has remained at the university. Agustin currently is director of SIUE's general education program, the core curriculum that defines SIUE's undergraduate educational experience. All universities have a general education requirement, the basic courses the university's faculty determines students must take before they can graduate. For SIUE, the general education requirements involve a wide range of skills including language, logic, analytical skills, quantitative reasoning, interpretation and communication. Because these skills come from a variety of disciplines, the university needs a member of the faculty who has a broad understanding of the curriculum to oversee the program. SIUE is currently in the process of phasing in its new general education program called the Lincoln plan.

"I have to work with the deans, coordinate with the deans to make sure that each phase can be executed smoothly and efficiently," she said. "And in these budgetary times that's a tall order."

She also works with faculty committees in developing the all-important on-going evaluations of the general education program to assure both faculty and students that the program is teaching the students what it is we want them to learn.

As important as her job is in overseeing the general education curriculum, her real love is teaching and research.

"I am passionate about teaching and I want my students to be actively engaged in the learning process," Agustin said. She directs senior projects and master's theses and devotes a great deal of time to meeting with students and mentoring them in their work. For example, she works with the School of Engineering to find ways to more effectively teach students calculus.

"Calculus serves as a gateway course for the science, technology and engineering areas so it is important to lay a solid foundation for the students," she explained. Toward this goal, she has used enrichment sessions, which combine her instruction with student- led approaches.

And just as calculus helps students, statistics, according to Agustin, can serve as a gateway for answering questions in a wide array of disciplines and topics. "That's the good thing about statistics," she said. "As long as you have data you can apply statistics."

*Stephen Hansen is Interim Dean, College of Arts and Sciences at Southern Illinois University Edwardsville.*