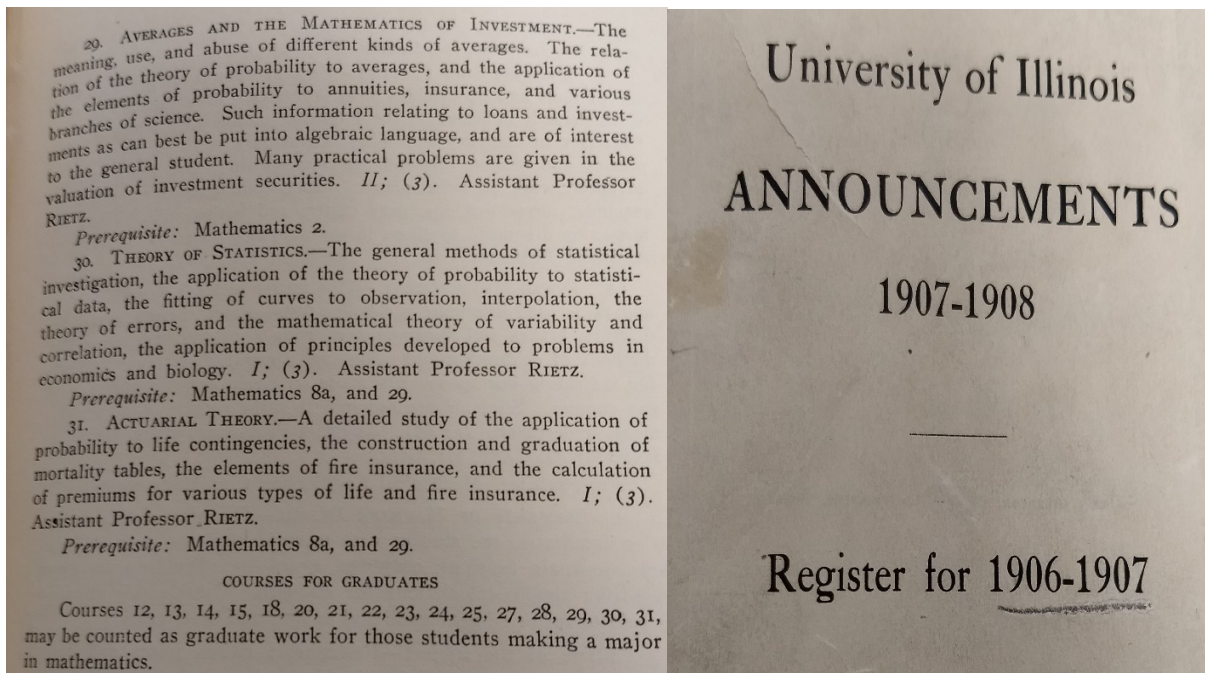


Brief History of the Actuarial Science Program at the University of Illinois at Urbana-Champaign

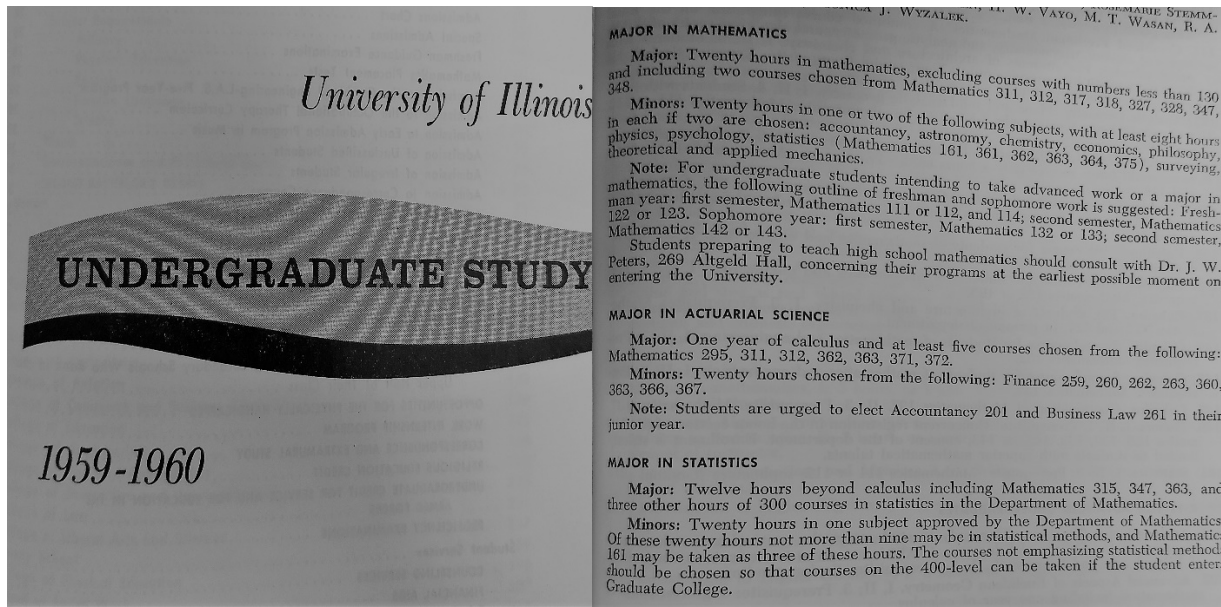
Early 1900's

Actuarial science at the University of Illinois Urbana-Champaign has its beginnings far before the creation of the actuarial science major. The first actuarial courses taught at the University of Illinois were *Actuarial Theory I & II*. These actuarial courses were offered by the Department of Mathematics and first taught in 1906.



Program Beginning

Through the late 1940's until the early 1970's the primary instructor of actuarial science courses at the University of Illinois was J. W. Peters. During this period, he taught the *Actuarial Theory I & II* courses, which was during a time of great change for actuarial science at the university. In 1959, the Actuarial Science program came into existence through the Department of Mathematics as both a major and a minor. Even though the only specifically actuarial courses at the time were *Actuarial Theory I & II*, the major was tailored to students looking towards the actuarial field, such as statistical courses in the mathematics department, and insurance-based courses in the finance department.



1970's & 1980's

During this time, there were two program directors, first was Kenneth Appel, who was then followed by Esther Portnoy. Portnoy began her time in the department in 1979, and after receiving her professional designation as a Fellow of the Society of Actuaries (FSA), took over as the program director. Not only was there new direction, but there were also some changes within the curriculum in the program. In 1971, there was the introduction of the Theory of Interest course. With the addition of the new course there was a need for new professors, and during this time Ralph Alexander taught the *Actuarial Theory I & II* courses and William Ferguson taught the new *Theory of Interest* course. The next change that was seen in the program was the addition of the *Actuarial Problem Solving* course.

Prior to 1983, most of the changes in the program were small, but with the growth of the program in 1983 brought on a larger shift in the program. The courses that were added this year were *Actuarial Statistics I & II*, *Actuarial Linear Techniques*, *Actuarial Risk Theory*, and *Special Topics in Actuarial Theory*. This large addition of courses was reflective of the increase in student enrollment in the program. During this period of the 1980's several professors taught the courses within the new curriculum, such as Kenneth Appel, Esther Portnoy, Hiram Paley, Donald Sherbert, Ralph Alexander, Steve D'Arcy, and Carl Jockusch. The research interests of these professors were diverse. Portnoy did research in mortality modeling, Sherbert's research was actuarial science and real analysis, D'Arcy, a professor in finance, focused on financial

pricing models applied to insurance, dynamic financial analysis, and financial risk management of insurers, Paley's research was in algebra, Alexander did research in integral geometry, while Jockusch worked in mathematical logic, especially computability theory and its connections with model theory, combinatorics, and asymptotic density. Appel taught courses for the actuarial science program, but is most famously known for his work on the four-color theorem.

1990's

In addition to all of the changes to the program in the late 1990's, there was the creation of the *Illini Actuary*, a newsletter for alumni and others associated with the actuarial science program, which provided information about the program including highlighting those who had gained accreditation in the actuarial field, served as sponsors of the university, and recipients of scholarships in the program. This was a good way to keep those formerly in the program in touch with changes going on and the further development of the program. Esther Portnoy would write on these developments and highlight the most important points, and she continued to do this into the early 2000's.

Fall 1995

ILLINI ACTUARY

Newsletter for alumni and friends University of Illinois at Urbana-Champaign

DEAR FRIENDS:

It has been five years since the last Illini Actuary. We at the program have been very busy! Our alumni have also been busy, among other things passing actuarial exams. Quite a few of you have earned new designations -- ACAS, FCAS, ASA, and FSA -- and only the most recent ones are acknowledged on page 3. I would welcome a volunteer (or better, several volunteers) to organize an alumni group that might, for example, maintain a directory and report more regularly on your laurels.

Meanwhile, your contributions keep coming in, and we spend them, largely on undergraduate scholarships. Earlier this fall I stopped in at the College development office to meet the students who phoned many of you as a part of our fund-raising campaign. It may not surprise you to hear that the actuarial alumni are outstanding in the level of response to these campaigns (and that makes you very popular among the students behind the phones).

Our enrollments have dropped in the recent past, and classes are of more manageable sizes -- for example, about 40 in Math 371, down from 80 to 90 a few years ago. We may need to begin "recruiting" in honors calculus sections again, but not until we see whether the latest "Jobs Rated Almanac" has an effect similar to what happened in 1990!

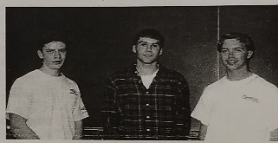
I am looking forward to a sabbatical in Australia for the coming spring semester. While there I will pursue my research interests, focusing on mortality rates among the very old (95 and up) and on some new statistical methods in two-dimensional graduation. I expect to have some interesting talks with the actuary in charge of Australian census, who contacted me earlier on some of these questions. But I also expect to do plenty of hiking (excuse me: bush-walking) and sight-seeing. I will continue to be in contact with the Department, and return in July to take up teaching duties for the fall semester of 1996.

(Prof.) Esther Portnoy

ACTUARIAL ALUMNI SCHOLARSHIPS

Back in the early spring of 1990 a small committee of alumni worked with Professors Appel and Portnoy to select the first group of Actuarial Alumni Scholarships. Those people have now graduated, many with honors, and you will find some of their names on the list of new ASA's. This fall six freshmen (class of '99) were awarded the scholarships, which provide \$500 per semester for two years. They are:

Steven Abbs, from Elgin
 Nikklaus Frank, from Carlock
 David Hanzlik, from Downers Grove
 (also a Rogers Scholar)
 David Minarik, from Arlington Heights
 Andrew Walter, from Downs
 Peter Wenk, from Villa Park



David Hanzlik, Nikk Frank, Peter Wenk

Yes -- all guys and all from Illinois! You alumni who are so generous with your contributions, please PLEASE also let strong high school students in your neighborhood know about our program and the availability of these scholarships. Maybe you could call a local high school and offer to speak to the math club or a senior math class.

Screening for the next group will begin next January. Some members of the selection committee will continue, but new viewpoints are always needed. If you would like to serve (this involves ranking applicants based on test scores, high school rank in class, and one-page essays) please write to Professor Don Sherbert.

2000's

In 2000, both CAS and SOA made significant changes to their exam structure and material with more finance, economic, additional and intensified elements. To compensate for this, the actuarial science program had to adjust the list of courses in its major requirements, with an increase in its minimum required major and supporting course hours. Additional classes needed to graduate were created and longer-hours courses were replaced by shorter ones. In the early 2000s, the program received approvals for two new courses, *Survival Analysis* and *Actuarial Modeling*, and one extra elective requirement from finance or economics courses was also added.

In 2004 Rick Gorvett took over as the director of the Actuarial Science Program. Gorvett was a Fellow of the Casualty Actuarial Society (CAS) and had major influence on shaping the curriculum to focus on property and casualty actuarial science. He remained in this position until 2016 when he became a staff actuary at the CAS. During the 2000's there were several developments within the program, and the addition of new courses was no different. In 2004, the new *Topics in Actuarial Theory I & II* courses were added and taught by Gorvett. The courses previously taught, *Actuarial Problem Solving*, *Theory of Interest*, *Actuarial Theory I & II*, *Actuarial Risk Theory*, and *Actuarial Modeling*, continued during this time and were taught by new professors within the department. The faculty teaching through this time were Yanyun (Judy) Zhu, Paul Johnson, and Jan Lommele. As an example of the growth of not only the program, but of the actuarial science field, Gorvett introduced a course in *Advanced Topics in Mathematics* in 2008. The faculty who taught courses in the program at the time, had a wide range of interests in different areas of study. Zhu worked in the areas of life insurance and investment decisions, Johnson's areas of research were in the applications of multilevel regression models to health care and health economics, while more specifically focused on Markov models for studying the cost effectiveness of various health care programs, while Lommele was a former practicing actuary who taught *Probability and Statistical Inference* and *Casualty Actuarial Science*. An endowed faculty position was created by State Farm to support actuarial education and research in the 2000's. Gorvett was the inaugural State Farm Companies Foundation Scholar in Actuarial Science.

Another major change to the Actuarial Science Program in the 2000's was the beginning of the Master's degree program in actuarial science. The actuarial graduate program originally started as a concentration within the Master of Science in Applied Mathematics program. The Master's degree program appealed to students with a non-actuarial undergraduate background who intend to pursue actuarial career paths.

MASTER'S DEGREE PROGRAMS

The master's degree programs can be completed in a year plus a summer or in one and one-half years of full-time study by students entering without deficiencies. Students entering with deficiencies may require two years to complete the degree. There are no thesis or language requirements, and no comprehensive examination is required. These programs may be revised; students are advised to check with the director of graduate studies.

Both the M.S. and M.A. in mathematics require a total of eight units, of which three must be at the 400 level in mathematics. The M.S. in Applied Mathematics requires eight units, of which two must be at the 400 level in mathematics. Specific course and sequence requirements for this degree can be satisfied through study in one of four options: (1) optimization and algorithms, (2) science applications, (3) computational science and engineering, or (4) actuarial science. An optional master's thesis is allowed in all options.

The M.A. in the Teaching of Mathematics requires eight units, of which four must be in mathematics and two in education. Specific course and sequence requirements must be met.

2010's

The Actuarial Science Program continued in its development, and in 2010 became a Center of Actuarial Excellence from the Society of Actuaries (SOA). In 2016, the department won the Casualty Actuarial Society (CAS) University Award. Further development of the program continued in 2016 with the appointment of Runhuan Feng as the director. Some of the major changes to the program have happened in the most recent years, with the development of data-analytics-driven curriculum to keep up with changes in both the SOA and CAS. Of the courses that were already offered, several gained new names to be more descriptive of the content within the courses, such as *Investment and Financial Markets*, *Loss Models*, *Life Contingencies I and II*, etc. The new added classes include *Introduction to Actuarial Research*, *Stochastic Processes for Finance and Insurance*, *Financial Mathematics*, *Predictive Analytics*, *Loss Data Analytics & Credibility*, *Extreme Value Theory and Catastrophe Modeling*, *Life Insurance and Pension Mathematics*, *Risk Modeling and Analysis* and *Risk Analytics and Decision Making*. Additional cross-listed statistical courses were also added to the curriculum, including *Basis of Statistical Learning* and *Applied Bayesian Analysis*. Not only did the curriculum revamp add more course variety, but it also built the foundation for more

comprehensive coverage of the actuarial curriculum. These changes have been guided by the faculty in the department, Runhuan Feng, Shu Li, Klara Buysse, Daniel Linders, Alfred Chong and Paa Kow Cole. In 2017, the Department of Mathematics PhD program introduced a new concentration in Actuarial Science and Risk Analytics, which is intended for students with strong quantitative background to pursue research and development career paths in academia and industry. Illinois became one of only a handful of universities with a PhD program in actuarial science at the time. In Fall 2018, the Master's degree program officially was renamed the Master of Science in Actuarial Science to replace the MS Applied Mathematics concentration. With the increased number of graduate level actuarial courses, the MS program was redesigned to provide two tracks of course plans to suit students' individual needs. The program offers students with no previous actuarial background fast track professional training, while students with actuarial background are expected to learn more advanced actuarial analytics beyond the professional exam curriculum.

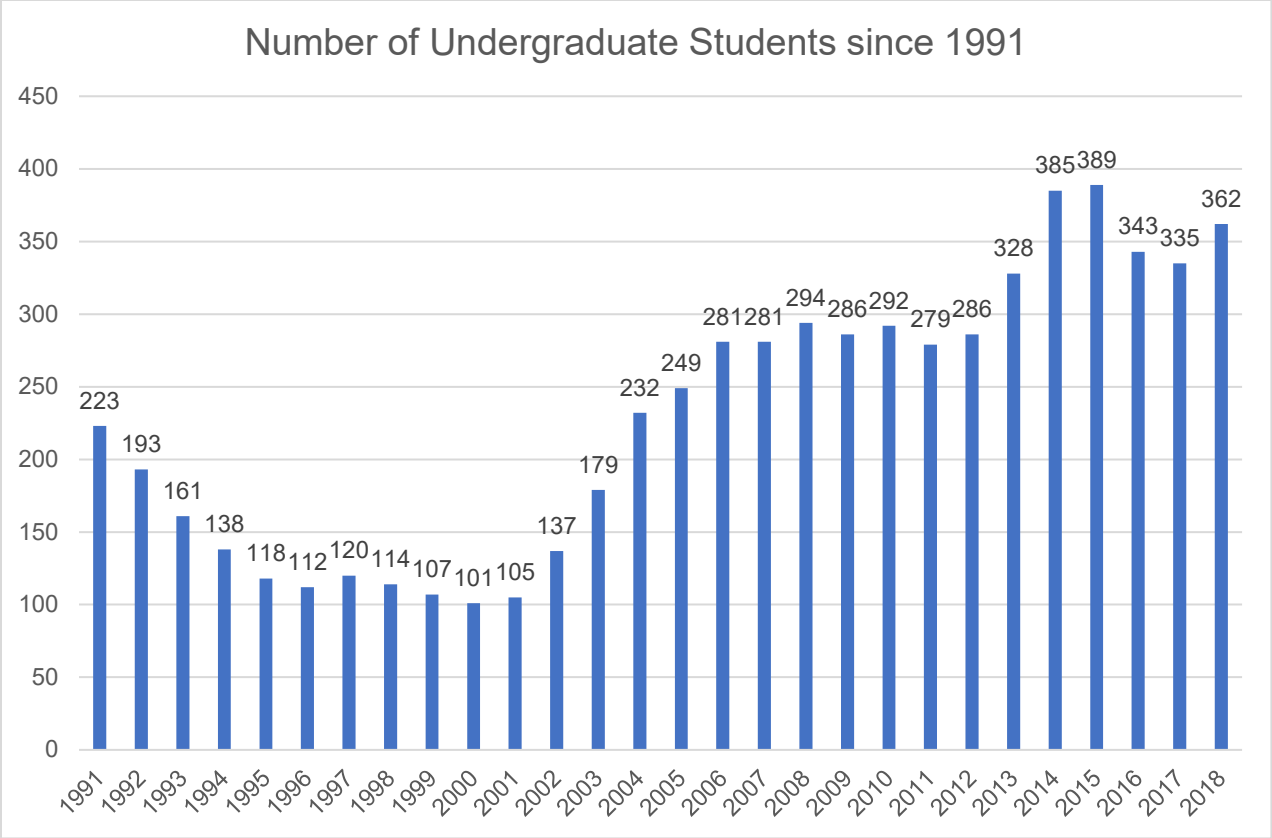
The faculty team became increasingly diverse in 2010s. Both Runhuan Feng and Shu Li were Canada-trained actuaries. Daniel Linders and Klara Buysse came with their professional training and work experience in Europe. Alfred Chong received his actuarial degrees in Hong Kong and the United Kingdom. Paa Kow Cole was trained under the British actuarial education system before joining the actuarial program as an instructor. Runhuan Feng is a Fellow of the Society of Actuaries (FSA) and a Chartered Enterprise Risk Analyst (CERA). His research focuses on collective risk theory, equity-linked insurance, quantitative finance and risk management. Shu Li specialized in collective risk theory and applied stochastic processes. Daniel Linders' areas of research include dependence modeling, investment combined insurance, quantitative finance. Klara Buysse has diverse corporate background with research interests in insurance regulation. Alfred Chong's research expertise is in optimal insurance, option pricing and applied stochastic control. Alfred is an Associate of the Society of Actuaries (ASA). Paa Kow previously taught a wide variety of actuarial and statistical courses in Ghana and in the US.

In 2018, the Actuarial Science Program took another step to professionalize its curriculum, as it created its own curriculum area ASRM (Actuarial Science and Risk Management) within university academic catalog. The new rubric more easily differentiates the courses that are most vital to the actuarial and risk management professions, and allows more

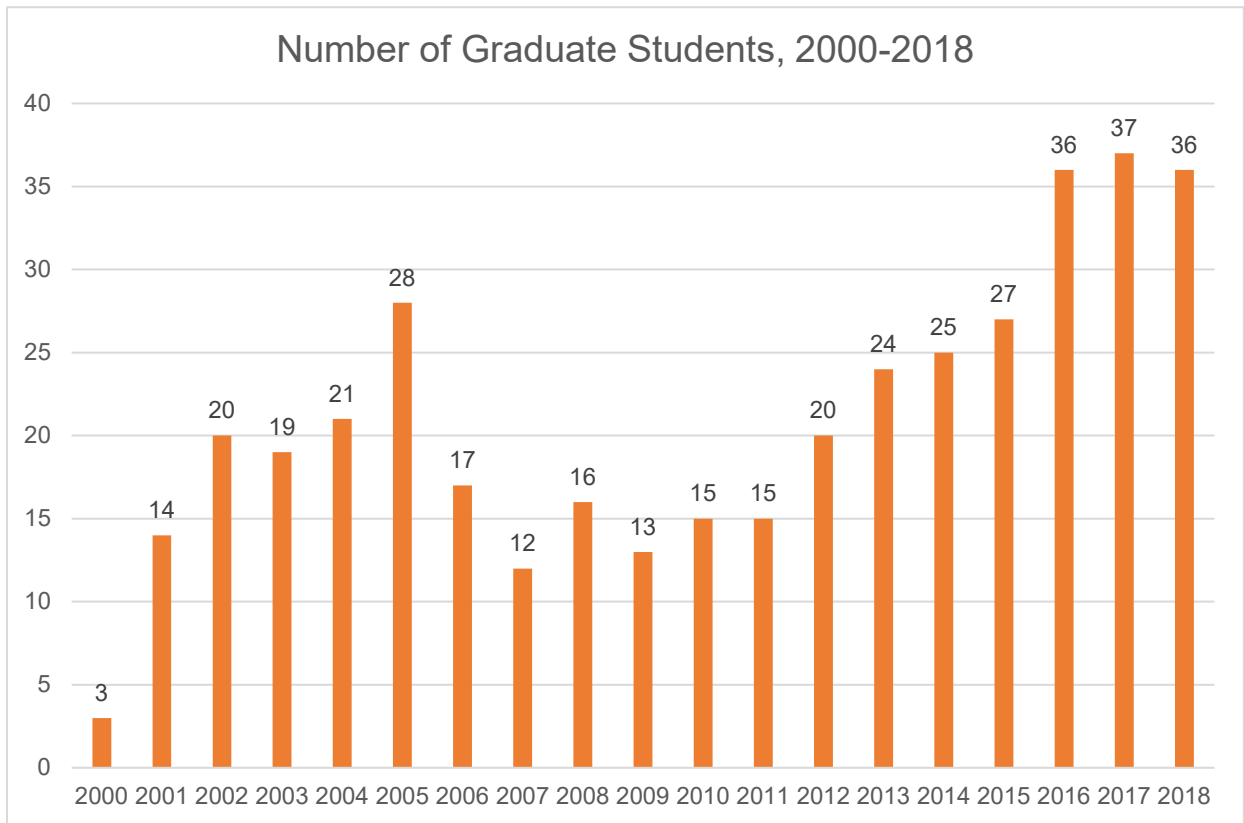
space to accommodate course variety and to expand curriculum in new areas of actuarial practice. In 2018, the Actuarial Science Program launched the Illinois Risk Lab, a virtual lab to facilitate research and educational activities involving industry-driven problems in the areas of actuarial science, risk management and advanced analytics. The lab grew out of a major educational grant from the Society of Actuaries to support undergraduate research from 2015-2018. The Illinois Risk Lab's success and popularity with students has made the lab an integral part of the research and educational mission of the program.

Enrollments

The undergraduate Actuarial Science Program experienced drastic changes in enrollment over the past few decades. It had approximately 35 students in the mid 1960's, but by the mid 1970's had shrunk to only five students. Student enrollment data for the 1970's and 1980's is unavailable, but by 1990 the number of students was over 200, dropping down to 100 students in 2000, and by 2018 has grown to close to 400 students enrolled in the Actuarial Science Program for undergraduate students.



The Master’s program started with only three students in the early 2000’s and grew to over 20 student in 2010’s. With the curriculum revamp, the MS program continues to attract more students with diverse background. The program has nearly doubled in size in recent years.



Alumni

Over the years the program has developed one of the largest actuarial alumni networks in the nation. According to the website DATAUSA.io, the University of Illinois produced in 2016 alone the second highest number of actuarial science majors and accounted for 6.9% of all graduates in the nation in 2016. Illinois actuarial students are highly sought after in the insurance industry.

One of the best markers of the program's success is the fact of students succeeding in the actuarial profession. In particular, there have been many notable alumni to the Actuarial Science program. Two of which are Bradley Smith who served as a former President of the SOA and Steve Armstrong who is the sitting President of the CAS. Many actuarial science alumni generously support the program, which has helped create several company-sponsored and alumni-sponsored scholarships for current actuarial science students.

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The article was originally written in Fall 2018 by Corbin Tucker, who is now an MS Actuarial Science alumni. Talia Sutio and Professor Runhuan Feng also contributed to the article.

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