Development of an Actuarial Science Program at Salisbury University

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Abstract: This paper focuses on the development of an actuarial science track for the mathematics major at Salisbury University (SU). A timeline from the initial investigation into such a program through the proposal and approval processes is shared for those who might be interested in developing a new actuarial program. It is wise to start small and take advantage of as many existing courses as possible. Two new courses were developed to fill the void at SU. These courses as well as seminars for preparing students for SOA/CAS exams are described. The extent to which the program prepares students for taking the actuarial exams and/or finding employment is also discussed.

Keywords: Actuarial science, courses, SOA exams.

1. INTRODUCTION

Interest in the field of actuarial science has tremendously increased over the past few years, with many institutions trying to start programs or upgrade existing programs. Salisbury University is no different from other institutions in this regard. At Salisbury University, the Department of Mathematics and Computer Science is part of the Henson School of Science and Technology. In Spring 2008 the dean of the school requested investigation of an actuarial science track within the mathematics major with implementation to require only local approvals. All department majors complete a core of eight courses: Calculus I, Calculus II, Discrete Math, Statistical Thinking, Statistical Thinking Laboratory, Linear Algebra, Calculus III, and Computer Programming. Course selections (8 to 11 courses) beyond the core depend on the focus of study: traditional or applied mathematics, mathematics/secondary education, statistics, computer science, and now, actuarial science.

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Often statistics students had expressed an interest in actuarial science. There are courses in the statistics concentration that will help students prepare for the first actuarial exam (called Exam P by the Society of Actuaries (SOA) and Exam1 by the Casualty Actuarial Society (CAS)); however, the concentration does not prepare them to the extent that is needed for the other exams. The existing statistics concentration prepares students to go to graduate school in statistics or to work as an applied statistician in industry or government. Hence, we did not wish to replace this concentration, but rather add an actuarial track for these students. Since we do not have enough demand for a major in actuarial science nor do we have faculty to teach all the required courses necessary for a major, we decided to start small and develop a program that would need a minimal number of new courses.

2. GETTING STARTED

In considering a new program in actuarial science, it is important to investigate programs and offerings at other institutions. Salisbury University (SU) is a four-year comprehensive university on the Eastern Shore of Maryland. It is part of the University of Maryland System. Many universities such as George Mason, Temple University, and Penn State offer advanced programs in actuarial science. Programs like these include 12 or more credit hours of course work at the advanced level. On the other hand, universities that had programs in actuarial science similar to what SU was considering were Appalachian State, University of Delaware, Howard University, University of MD, Baltimore County (also in the University of Maryland System), and University of Virginia. Looking at these programs, it was determined that SU already offered many of the necessary courses within the offerings of the Mathematics and Computer Science department and those within the Business School such as the Economics, Accounting, and the Finance departments. However, there was still a need for courses in financial mathematics and in financial and actuarial modeling.

During the same semester in which the department was considering a new program, SU had the great fortune of hiring someone with expertise in actuarial science who was retiring to Maryland’s Eastern shore. This person has written materials and textbooks in the field as well as having taught seminars for preparing for the SOA/CAS exams. With his expertise and assistance, it was relatively easy to put forth a proposal. He determined that the proposed track would require only two additional courses that were not currently offered at SU. He developed these courses and the proposal for a new track in actuarial science was made. The new program was approved during the Spring semester of 2010.

The new track in actuarial science wraps two new courses around existing SU courses in Mathematics, Computer Science, Finance, and Economics. One of the two new courses is Financial Mathematics (Math 215), which introduces
students to interest theory and finance at a mathematical level different from the finance courses currently offered in the business school [4]. The current textbook for this course is, *Financial Mathematics: A Practical Guide for Actuaries and other Business Professionals* [2]. The Financial Mathematics course has a calculus prerequisite and should prepare students to take the second exam (SOA Exam FM; CAS Exam 2). The other course is a senior-seminar-type course, Actuarial and Financial Mathematics (Math 415), which has a prerequisite of Mathematical Statistics I [3]. The current textbook for this course is *Actuarial Models: An Introductory Guide for Actuaries and other Business Professionals* [1]. Content covered in this course prepares students for the third actuarial exam (SOA Exam MLC; CAS Exam 3L).

Students who complete the track in actuarial science are ready to assume an entry-level position as an actuarial student (trainee) in an insurance or government organization. The track does not focus solely on serving the demand for actuarial talent. Completion of the track also serves as a basic preparation for graduate work in Finance, Economics, Applied Mathematics, Statistics, or as a springboard to a career in finance, investments or risk management.

3. REQUIREMENTS

3.1. Actuarial Science Track

Beyond the mathematics core requirement of 28 credit hours, students pursuing the actuarial track must also complete the following mathematics courses: Introduction to Financial Mathematics (new course Math 215), Regression Analysis, Mathematical Statistics I, Mathematical Statistics II, and Actuarial and Financial Models (new course Math 415). In addition, students must also complete the following courses from the Economics, Accounting, and Finance departments: Micro-and Macro-Economics, Introduction to Financial Accounting, Financial Management, and Risk Management and Insurance.

3.2. Actuarial Science Minor

It was also determined that a minor in actuarial science might be of benefit to some students. Students majoring in mathematics under some other track or concentration may wish to take just some courses related to the actuarial field. It is also the case that some students, particularly from the business school, who have taken some calculus, economics, and finance courses, may wish to complete a minor in actuarial science. To complete the minor, a student must take three semesters of Calculus, Mathematical Statistics I, Actuarial and Financial Models (new course Math 415), and either Introduction to Financial Mathematics, (new course Math 215) or Financial Management (Finance department).
4. RECRUITMENT/OUTCOMES

The first course in financial mathematics was taught as a topics course during the Spring semester 2010 as we waited for approval of the track; it was approved that same semester. One student pursuing the statistics concentration decided to also follow the actuarial track; he passed SOA Exam P/CAS Exam 1 in January 2011. In March of that same year, another student passed SOA Exam P/CAS Exam 1 and went on to pass SOA Exam FM/CAS Exam 2 in the Summer of 2011.

In order to get this program up and running, courses have been taught as independent studies or through seminars until classes can be offered on a regular basis. The two new courses, as with many of our upper-level courses, are not offered every semester. The Introduction to Financial Mathematics course is to be offered every Spring and the upper-level Actuarial and Financial Models course will be offered in the Spring of alternating years. With students near graduation and eager to add this track once it was approved, these courses had to be offered off sequence to accommodate them. The first student to pursue this track graduated in the Fall of 2011.

In an effort to recruit students, SU holds open-house sessions several times a year. Representatives from various departments are there to speak to families of potential students. The Department of Mathematics and Computer Science always has two faculty members present, usually one mathematics faculty member and one computer science faculty member, to discuss programs and options for students majoring in mathematics or computer science. The department has also prepared fact sheets for each of the majors, tracks, and/or concentrations. Copies of these factsheets are available to visitors at the open house as well as on the university’s website. The fact sheet, describing the statistics concentration and the actuarial track, is located at http://www.salisbury.edu/admissions/deptfacts/pdfs/SU-Mathematics-Major-Statistics-and-Actuarial-Science.pdf.

Many of the mathematics and computer science majors are members of the Math and Computer Science Club. This club holds meetings and activities on campus. Meetings often consist of guest speakers presenting topics in the various fields of mathematics, statistics, computer science and now actuarial science. The club is actively engaged in several projects and events, and students try to recruit new majors into the club. When this track was first approved, SU’s newly hired actuarial science professor gave a presentation to the math and computer science club to discuss the new track as well as employment possibilities for graduates of this track.

The actuarial track at SU is continuing to grow. Many students are pursuing both the statistics concentration and the actuarial track. There are many courses that do count toward both programs. The author of this paper, a statistician, spent a sabbatical learning the material that is taught in the Actuarial and Financial Models course. Another statistics faculty member is currently teaching the Introduction to Financial Mathematics course. These
two faculty members are working jointly, and with our colleague who developed these two new courses, in order to be able to take over for him when he decides to retire entirely.

Several students enrolled in these still relatively new actuarial courses in the Spring 2013 semester and are preparing to take SOA Exam P/CAS Exam 1 and SOA Exam FM/CAS Exam 2. During the pre-registration/advising period in Spring 2013, several students indicated that they are going to pursue the actuarial track or both the actuarial track and the statistics concentration.

One area of concern is the outreach into the community to get internships/jobs in the field of actuarial science. Salisbury is a small city but surrounding areas of the Eastern Shore of Maryland are very rural. There is not much industry nor are there large consulting firms or insurance companies. However, Salisbury is within two to three hours from Baltimore, Washington DC, and Philadelphia and approximately five hours from New York City. Therefore, it is possible for a student to work as an intern in the summer in one of these nearby cities, particularly if the student lives near one of these areas. In fact, a current student has landed such a summer internship through contacts he had in his hometown.

5. THOUGHTS FOR THE FUTURE

Validation by Educational Experience (VEE) is a central part of future planning for the actuarial science program at SU. It is important to provide VEE credit for students taking the courses in this program. The “Application for Approval of Validation by Educational Experience Credit” must be submitted to the VEE Administration Committee [5]. Once a course/educational experience is approved, it is added to the “Directory of Approved VEE Courses/Experiences” or the “Standardized Exams and Other Educational Experiences” list on the CAS (www.casact.org) and SOA (www.soa.org) websites.

Five of the courses at SU have been approved for VEE credit and are listed on the websites. These courses were approved for students taking the courses between 2000 and 2008, so reapplying for approval should be routine. Two of the five courses are Microeconomics, Macroeconomics; those are needed for the VEE economics requirement. The courses, Corporate Finance and Investments I, that are required for VEE Corporate Finance and are each taught in the Business School at SU, also have prior approval. The Regression Analysis course has also been approved, which is part of the requirement for VEE Applied Statistical Methods.

Unfortunately, a time series and forecasting course is also required for VEE, but a course in time series analysis is not currently offered at SU, which means that VEE credit for Applied Statistical Methods would not be possible since both areas of application are required. However, we hope to develop a course in time series sometime in the future. In fact, faculty have already
discussed offering time series as a topic in the Advanced Topics in Statistics course, which is required for the statistics concentration. This would be on a trial basis prior to proposal for a new course.

6. RECOMMENDATIONS

Since there is a growing interest in actuarial science, more and more universities will no doubt consider developing a program in the field. Depending on the student body, the demand for such a program, and the expertise of current faculty members, programs can vary from small introductory-level to large-advanced programs. Universities considering programs in actuarial science should take advantage of as many existing courses that are already available. Faculty should be willing to encourage or recruit students into the program as well as offer seminars to prepare students to take the SOA/CAS exams. For universities beginning programs in actuarial science, hiring people with expertise in the field may be one of the more challenging tasks.

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BIOGRAPHICAL SKETCH

Barbara A. Wainwright has a Ph.D. in Statistics from the University of Delaware. In addition to teaching and advising students pursuing the statistics concentration, she has recently been actively involved with the development of the new actuarial science track with Dr Michael Gauger. She is currently studying material so that she may soon teach Actuarial and Financial Modeling.