Slide 1



- Undergraduate Mathematics and Statistics at Youngstown State University
- 150 undergraduate mathematics/mathematics education majors.
 Tracks within the Bachelor of Science Degree.
 Actuarial Mathematics track has approximately 10 students.

- Graduate Mathematics and Statistics at Youngstown State University
- 30 graduate mathematics students.
 Concentration within the Master of Science Degree.
 Actuarial Mathematics track has approximately 10 students.

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Stat 5800: Mathematical Foundations of Actuarial Science

Course Description: A survey of probability theory and an introduction to risk management. Emphasis of the course will be on problem solving with applications in actuarial science.

Prerequisite: Theory of Probability or consent of instructor. 3 semester hours.



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Stat 5802: Theory of Interest

Course Description: Mathematical theory and techniques in analysis of interest. Topics include measurement of interest, force of interest, annuities, amortization, pricing of investment products, and applications to actuarial sciences.

Prerequisite: Calculus II and an upper-level mathematics, finance, or economics course. 3 semester hours.



Stat 6904: Life Contingency Modeling I

Course Description: An introduction to various statistical, financial, and mathematical models used to determine insurance premiums. These models identify contingent risks and are based upon individual risk model frameworks.

Prerequisite: Theory of Probability. 3 semester hours.



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Stat 6905: Life Contingency Modeling II

Course Description: An introduction to multiple life functions, multiple decrement models, valuation theory for pension plans, insurance models including expenses, nontorfeiture benefits and dividends, and other means to determine benefit premiums.

Prerequisite: Life Contingency Modeling I. 3 semester hours.



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Stat 6910: Loss Models

Course Description: An introduction to the development of loss and severity models used in actuarial science and the statistical methods used to estimate the parameters of such models. Additional topics, including credibility and simulation, may be covered.

Prerequisite: Theory of Statistics. 3 semester hours.



Stat 6988: Modeling in Financial Economics

Course Description: A study of modeling and evaluation of derivatives and bonds and risk management using derivatives. Topics cover various models in asset evaluation, such as bond price models, the Black-Scholes model, diffusion processes, and risk management.

Prerequisite: Theory of Probability. 3 semester hours.



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Collaboration Background

- Youngstown State, University of Akron, Kent State, Cleveland State, and Case Western Reserve all offer similar actuarial science programs.
- Because our enrollment in these programs is often not enough to support the programs at each individual institution, we have sought ways to collaborate.

 Also seek to involve other institutions with undergraduate focus, including private colleges and universities in the area, such as Slippery Rock University and Westminster College.

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Area Survey

 Surveys sent to Department Chairs of area colleges and universities to gauge interest in an actuarial science graduate program. Fifteen schools responded.



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Do you currently offer undergraduate courses for students interested in actuarial science?

We have courses covering all of the learning objectives for the 5 preliminary exams of SOA. Also electives in health insurance, pensions and general insurance. Courses offered annually.

We have a certificate in "Actuarial Mathematics and Statistics". Entry level stat/business/finance classes are offered every semester. Prep for the P/1 exam is offered every other year (athough the demand is increasing, so this may change). Prep for the FM2 exam is offered noce a year. Demand is difficult to assess, as students from multiple majors take each class.



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Do you currently offer undergraduate courses for students interested in actuarial science?

We offer a year long probability and statistics course (a total of 8 credit hours) that is sufficient to prepare students for the preliminary actuarial examination. The enrollment is about 20-25.

We teach a 300-level probability course that has a Calc II prerequisite. It usually has around 10 students offered every other year.

Introduction to Actuarial Science - About 10 students, every other year



Do you currently offer undergraduate courses for students interested in actuarial science?

Exam P -Mathematical Statistics I \& II (every other year) (about 20-25 students) Exam FM - Theory of Interest (every other Fall) (10 -12 students)

Probability and Mathematical Statistics - 2 courses, every other year

We have an undergraduate major in mathematics/actuarial science, covering required courses in all of the VEE and exams P/1, FW/2, MLC3L. Enrollment varies. The number of majors is typically between 45-50.



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Do you have students attempting or passing actuarial examinations annually? If so, approximately how many in each category?

In the future, I expect about 5-10 students will attempt to pass the Probability exam in the summer of even years and 5-10 students will attempt to pass the Financial Math Exam in the summer of odd years.

Passing 3 exams - about 1 per year Passing 2 exams - about 5 per year Passing 1 Exam - about 12 per year

Yes. Roughly five students per year sit for Exam P.



- What skills would you like to see emphasized in a graduate program in actuarial science?
- Regression, ANOVA, statistics in general. Solid math skills. Good Access (database) skills. SAS and R training. · Work towards passing exams MFE, MLC and C.
- I would only recommend a graduate program in actuarial science to a student who did not pursue actuarial science as an undergrad.

· Coursework related to exams after P and FM

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What skills would you like to see emphasized in a graduate program in actuarial science?

- A steady progression towards Associate in Society of Actuaries.
 Learning about self-motivation for studying.
 Kavareness that an actuary will be an executive in the insurance business and some knowledge about what is expected in the business setting.
 Maybe a general course about the sequence of courses/topics that are important for actuaries and are expected to know in order to develop insurance policies. For insurance topics, but there are also economics, law, ethics-and as they progress through their training, they will need to become very conversant in these topics.
- £.



Other Comments and Suggestions

If a student's undergraduate program offers any type of actuarial program, students who graduate with exams passed will likely find jobs. In my opinion, a Master's level program will attract students whose undergrad didn't not have any actuarial classes and those that have not yet passed exams. A quality, motivated student doesn't need a Master's degree to find a great job in this field. I think it is a great idea, just trying to help identify your audience.



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Other Comments and Suggestions

Our students have been very successful in our undergraduate program. The only purpose for pursuing a graduate program in actuarial science (from my point of view) would be for a person to try to get into the field if they had already received their Bachelors but didn't hursue the courses or exams while they were an undergrad. A student who pursued actuarial science as an undergrad and did not do well enough (either through grades, exam performance, or other reason) would be unlikely to benefit from a graduate program (unless they wanted to improve on their lackluster undergrad performance and those are not really the students I would want to build a graduate program around).

Was just wondering what YOU would want in an undergraduate (math student?) who may be considering becoming part of your graduate actuary program?

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Objectives

Objective 1: Distance Courses

- We would capitalize on each institution's strengths and offer distance courses through videoconferencing and/or travel to a central facility. These courses could include the VEE courses in statistics and the actuarial models course.
 Distance education versions of actuarial models and theory of interest have been developed.
 Currently working out the "finer" details of such an arrangement.

Objectives

Objective 1: Collaboration in Courses

Both Kent State and Youngstown State taught Theory of Interest in Spring 2013.
 Goal was to create uniformity in the course so that it could be offered at one institution in the future.



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- Common Courses and Subjects
- Both YSU and Kent offer Theory of Interest and two life contingency courses. They both also offer courses that teach the basics of derivatives markets.
- Kent State does not have a statistics program so YSU, Cieveland State, and Akron are better poised to offer more statistics and data mining courses.
- · All universities offer a theory of interest course.

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Objectives

- Objective 2: Joint Degree Programs

- The template for such degree programs has already been established.
 Considering a joint master's degree in actuarial science to be offered by the consortium.
 In the design phase of the proposal, would welcome feedback from actuaries regarding relevant courses and programming.





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Proposal for Master's Degree in Actuarial Science (cont'd)

Two courses chosen from: • Life Contingency Modeling II, Corporate Finance, Microeconomics, Macroeconomics, Statistical Data Mining, Statistical Computing, Nonparametric Statistics, Simulation, Linear Methods, Multivariate Statistical Analysis, Stochastic Processes

More hours from this list will be required if courses are waived due to undergraduate or actuarial exam credit. Two qualifying examinations (offered each August); may be waived by passing two SOA exams.



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Objectives

Objective 3: Outreach

 Also want to expand outreach to high school students and undergraduates in the region through contests, speakers, and other events to raise awareness.

 Piloted Project Math Minds at Youngstown State MathFest for four years. Last year, one student won \$3000 scholarship for her entry in the contest.



Analysis of Collaboration

Pros of Collaboration

- Facing limited budgets and hesitancy to grow new programs, collaboration offers an opportunity to serve students while conserving resources.
 A variety of courses could be offered that would not run individually at each institution.
 Opportunities for outreach in larger areas.
 The ability to try something new and be on the "cutting edge" of this growing field.

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Quality Control

- Control Control
 The respective department chairs will jointly coordinate and determine the scheduling of classes, hiring of faculty, and assignment of teaching responsibilities.
 An Academic Council comprised of the university graduate deans or their appointer frepresentatives will approve all major policy and program matters.
 Orgenting expenses at each of the campuses will be the responsibility of that campus. Aready existing private funding for programming at each of the institutions will remain with those institutions.
 An advisory board of Fellows and Associates of the SOA and CAS will be consulted for programmatic development and changes.
 Assessment practices at each university will be used to gauge the enciveness of each program.



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Questions/Comments

We welcome any questions, comments, and suggestions to make the collaboration even stronger.

Please contact Tom Wakefield, tpwakefield@ysu.edu.