

# Actuarial Mathematics at Kent State University

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September 6, 2023

# What is an Actuary?

Actuaries are professionals who

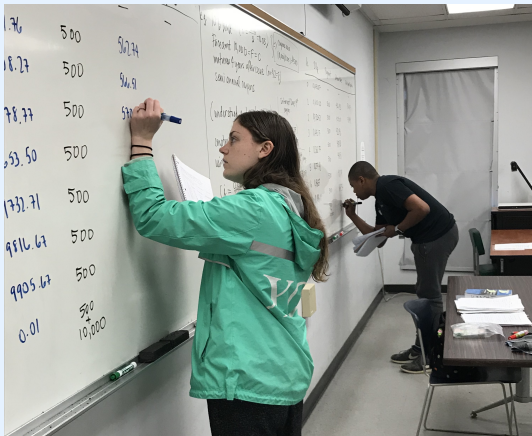
- ▶ Manage risk
- ▶ Predict the likelihood of future events and model the financial impact of future scenarios
- ▶ Find creative ways to mitigate the undesirable effects of future events

Employment

- ▶ Most are employed in the insurance and financial industries
- ▶ Others work in the transportation, environmental, medical, and manufacturing industries and in government
- ▶ Number of jobs in this field is increasing at a rate of 18% (much faster than average)
- ▶ Median entry-level annual salary of actuaries is about \$77,000
- ▶ Always highly ranked in job satisfaction surveys

# Actuarial Mathematics at Kent State University

- ▶ BS in Actuarial Mathematics beginning with the 2019-20 catalog
- ▶ Previously Concentration under BS in Mathematics
- ▶ **If you are on an old catalog, your requirements have NOT changed.**



## Sequencing Recommendations: General Principles

- ▶ Max 3 MATH courses per semester
- ▶ Spread Kent Core courses across whole 4 years
- ▶ Spread Business courses, but start early if considering minor or double major
- ▶ CS requirement early— first semester is best
- ▶ Summer MATH classes very challenging
- ▶ Remember that all MATH prereqs require C or better (really should have B or better)
- ▶ Two issues in prerequisites:
  - ▶ Content
  - ▶ Mathematical maturity

# Sequencing Recommendations

- ▶ Take in sequence without skipping a semester:
  - ▶ MATH 12002 Analytic Geometry and Calculus I
  - ▶ MATH 12003 Analytic Geometry and Calculus II
  - ▶ MATH 22005 Analytic Geometry and Calculus III
  - ▶ MATH 32044 Ordinary Differential Equations (“Calc IV”)
  
- ▶ Can take concurrently with MATH 12003 (Calc II)
  - ▶ MATH 21001 Linear Algebra
  - ▶ MATH 20011 Decision Making Under Uncertainty
  
- ▶ Can take concurrently with MATH 22005 (Calc III)
  - ▶ MATH 30055 Mathematical Theory of Interest
  - ▶ MATH 31011 Proofs in Discrete Mathematics

## Highlights of Course Timing

- ▶ MATH 30055 (Theory of Interest) is offered in Fall
  - ▶ Actuarial Math students should take it Fall of sophomore year
  - ▶ Then take Exam FM in spring
  
- ▶ MATH 40011 (Probability) is offered both Fall and Spring
  - ▶ Actuarial Math students should take it Spring of sophomore year
  - ▶ Then take Exam P in summer
  
- ▶ MATH 40055-6 (Act Math I-II) can then be taken junior year
  - ▶ Prereqs are MATH 30055 and MATH 40011
  - ▶ Okay to take in senior year

## Sequencing Recommendations

- ▶ MATH 40059 Stochastic Actuarial Models is probably hardest course in Actuarial Math curriculum— take Spring of senior year
  
- ▶ ECON 32050 Applied Econometrics I
  - ▶ Prerequisites
    - ▶ MATH 12002 (Calc I)
    - ▶ MATH 20011 (Decision Making Under Uncertainty)
    - ▶ ECON 22060 (Microeconomics)
  - ▶ ECON 32051 Applied Econometrics II is a good course for our students, so maybe take ECON 32050 earlier than indicated on roadmap

## See your advisors each semester!

- ▶ Professional Advisor: College of Arts & Sciences
  - ▶ University and College graduation requirements
  - ▶ Can lift your pin to register for classes
  
- ▶ Faculty Advisor: Dr. Kracht: [drkracht.youcanbook.me](http://drkracht.youcanbook.me)
  - ▶ Mathematics requirements
  - ▶ Advice on which course to take when
  - ▶ Can lift your pin to register for classes
  
- ▶ Additional advisors for other majors, minors
  - ▶ How many courses can be double-counted?



## Typical/Recommended Second Major or Minor

- ▶ Finance
- ▶ Economics
- ▶ Data Analytics
- ▶ Computer Science
- ▶ Insurance Studies
- ▶ Foreign language
- ▶ Anything the you love!

# SOA Credentialing: ASA (Associate of the Society of Actuaries)

- ▶ Exam P–Probability
  - ▶ Exam FM–Financial Mathematics
  - ▶ Exam FAM–Fundamentals of Actuarial Mathematics
  - ▶ Exam ALTAM–Advanced Long-Term Actuarial Mathematics
  - ▶ Exam ASTAM–Advanced Short-Term Actuarial Mathematics
  - ▶ Exam SRM–Statistics for Risk Modeling
  - ▶ Exam PA–Predictive Analytics
- 
- ▶ VEE Mathematical Statistics
  - ▶ VEE Economics
  - ▶ VEE Accounting and Finance

## KSU is designated **UCAP-Advanced Curriculum** by the SOA

- ▶ Exam P–Probability: MATH 40011
- ▶ Exam FM–Financial Mathematics: MATH 30055
- ▶ Exam FAM–Fundamentals of Actuarial Mathematics: MATH 40055–56; 40059 (*covers half*)
- ▶ Exam ALTAM–Advanced Long-Term Actuarial Mathematics: MATH 40056 (*covers some*)
- ▶ Exam ASTAM–Advanced Short-Term Actuarial Mathematics
- ▶ Exam SRM–Statistics for Risk Modeling
- ▶ Exam PA–Predictive Analytics

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- ▶ VEE Mathematical Statistics: MATH 40012
  - ▶ VEE Economics: ECON 22060-1
  - ▶ VEE Accounting and Finance: ACCT 23020, FIN 36063

*(Grade of B- or better required for VEE credit)*

## ASA Pathway Requirements and Transition Rules

- ▶ Several other modules and elearning courses are required for the ASA
- ▶ New requirements and exams will be phased in over a few years.
- ▶ For full details:

<https://www.soa.org/education/exam-req/edu-asa-req/>

- ▶ Exam 1/P –Probability: MATH 40011
- ▶ Exam 2/FM–Financial Mathematics: MATH 30055
- ▶ MAS-I–Modern Actuarial Statistics I
- ▶ MAS-II–Modern Actuarial Statistics II
- ▶ Exam 5–Basic Ratemaking and Estimating Claim Liabilities
- ▶ Exam 6–Regulation and Financial Reporting

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- ▶ VEE Economics: ECON 22060-1
  - ▶ VEE Accounting and Finance: ACCT 23020, FIN 36063  
*(Grade of B- or better required for VEE credit)*

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- ▶ Several other modules and elearning courses required
  - ▶ For full details:

<https://www.casact.org/credential-requirements>

# Actuarial Exams

- ▶ Goal:
  - ▶ Pass 2 exams before graduating
  - ▶ Earn credential within 5 years of graduating
- ▶ Pass rates typically approx 50%
- ▶ Students grossly underestimate time and effort needed to pass
- ▶ Approx 100 hours of study per hour of exam
- ▶ Download syllabus and readings from SOA website
- ▶ Exam prep materials:
  - ▶ Sample questions and solutions on SOA website (Free)
  - ▶ ASM (Actuarial Study Materials) Manuals (Inexpensive)
  - ▶ ACTEX Learning Manuals (Inexpensive)
  - ▶ ACTEX GOAL Software
  - ▶ The Infinite Actuary (TIA) on-line materials (Expensive)
  - ▶ Coaching Actuaries on-line materials (Expensive)
- ▶ Register for exam on SOA site, then reserve time on Prometric Test Center site
- ▶ Fees will be reimbursed if you pass!

Internships: Start applying in the fall for the following summer



# Independent Research Project

**RESULTS**

- Results are given in a range from low APV of expenses to high APV of expenses
- Estimates are for semi-private room costs in Ohio, and are sorted by male and female
- Females can consistently expect higher APV compared to male counterparts
- Lowest APV of costs would be for a male over the age of 95 at \$141,700

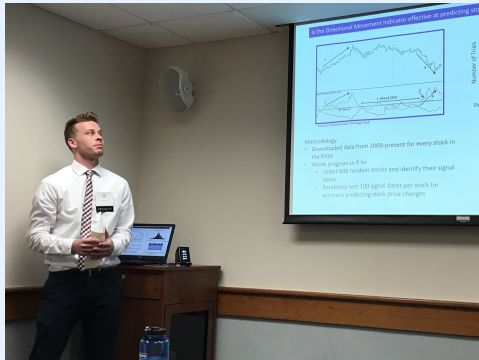
Low and High Cost Estimates

Age	Male Low	Male High	Female Low	Female High
65-64	317,800	411,800	378,800	508,200
65-74	269,800	359,800	329,800	438,200
75-84	278,700	368,800	338,800	447,200
85-84	318,800	408,800	378,800	507,200
95+	141,700	188,800	191,800	258,200



# SURE: Summer Undergraduate Research Experience

Apply in spring for summer 2023.



# Actuarial Math Club: Student presentations



# Actuarial Math Club: Recruiters



- ▶ President
- ▶ Vice President
- ▶ Secretary
- ▶ Treasurer
- ▶ At-Large

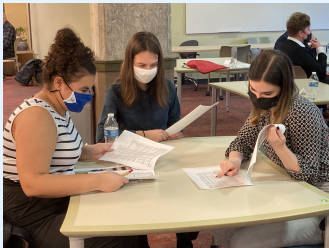
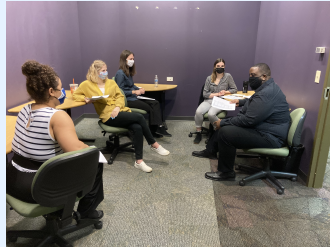
Candidates:

- ▶ Alexis Lytle
- ▶ Nominations from the floor...

# YSU PME Student Conference: every February



# MAPFRE Insurance Simulation Competition



# Your Future!

