

Math536 Course Syllabus

Course Title

Actuarial Probability

Course Number

Math536-01

Instructor, Office, Email

Instructor: Jinguo Lian

Office: LGRT(1028)

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Class Schedule and Location

Section 1: MWF 10:10-11 am in LGRC A201

Office hours

MWF: 2:30-3:30PM by an appointment

Prerequisites

Math 233, Stats 515.

Required Materials

Textbook: ASM Study Manual for Exam P 6th or later Edition by Weishaus. You can buy it online at <https://www.studymanuals.com/Product/Show/453148820>

Calculator (required): Texas Instruments BA II plus calculator or following models approved by SOA,

- BA-35

- BA II Plus
- BA II Plus Professional
- TI-30Xa
- TI-30X II (IIS solar or IIB battery)
- TI-30XS MultiView (or XB battery)

Gradescope: We will use [gradescope](#) to grade in-class teamwork and homework assignments.

I will synchronize the class roster through the Canvas directly during the first week of the spring semester, you will get a notification from Gradescope to access your account directly.

Teaching Assistants

Grader: TBA

Description

This 3 credit hours course serves as preparation for SOA's first actuarial exam in financial mathematics, known as Exam P or Exam 1. Math 536 serves as a preparation course for the first SOA/CAS actuarial exam on the fundamental probability tools for quantitatively assessing risk, known as Exam P (SOA) or Exam 1 (CAS). The course covers general probability, random variables with univariate probability distributions (including binomial, negative binomial, geometric, hypergeometric, Poisson, uniform, exponential, gamma, and normal), random variables with multivariate probability distributions (including the bivariate normal), basic knowledge of insurance and risk management, and other topics specified by the SOA/CAS exam syllabus.

Learning Objectives

1. General Probability: students will understand basic concepts of probability and discrete mathematics.
2. Univariate Random Variables: Students will understand discrete univariate distributions (including binomial, geometric, hypergeometric, negative binomial, Poisson, uniform) and continuous univariate distributions (including beta, exponential, gamma, lognormal, normal, and uniform) and their applications.
3. Multivariate Random Variables: Students understand key concepts in the discrete and continuous settings concerning multivariate distributions, the distribution of order statistics for independent random variables, and linear combinations of independent random variables, along with associated applications.

4. Study Groups

In the first class, students voluntarily form teams, with no more than 6 people in each team. Each team, the team members elect the team leader and report to me at the end of class. Each student must join a team to do the teamwork. You may also discuss homework questions, keystrokes, course materials and formulas with your team members, which may help you understand material better, and be a quick path to prepare Exam P.

Course Requirements

As a three-credit course running over spring semester you should plan to spend about 10 hours a week learning, study, and interact in the classroom. You should attend the class regularly to participate in the teamwork, check for grades and feedback, and ensure you are engaging with the course material, your classmates, and with me.

Participate the teamwork each class.

Complete homework assignment on Canvas.

Attending and completing the final exam in the pointed period.

Weekly Schedule

The following is meant to give a general idea of which sections are covered in which weeks. Coverage may be different depending on such factors as MWF vs. TuTh schedule, different paces of individual instructors, etc. However, it is expected that all these sections will be covered.

<i>Week</i>	<i>Lecture</i>	<i>Events</i>
1/27	Introduction	The semester starts on 1/30 First lecture on Friday 1/31
2/3	set, combinatorics, conditional Probability	Wednesday 2/5 is the last day to add or drop Hw-1 is due 2/7, 11pm on gradescope
2/10	Bayes' Law, Random variables, Conditional probability for random variables,	Hw-2 is due 2/14, 11pm on gradescope
2/17	Mean, Variance and other moments, Percentiles	Monday 2/17 is a Holiday; Thursday is Monday's schedule

		Hw-3 is due 2/21, 11pm on gradescope
2/24	Mode, Joint distribution for discrete random variables, Marginal distribution for discrete random variables	Hw-4 is due 2/28, 11pm on gradescope
3/3	Joint moment for discrete random variables, Covariance for discrete, Conditional moment for discrete	Hw-5 is due 3/7, 11pm on gradescope
3/10	uniform distribution, Double expectation formula, Binomial distribution	Hw-6 is due 3/14, 11pm on gradescope
3/17	Spring Recess	
3/24	negative binomial distributions, Poisson distributions, exponential distribution	Hw-7 is due 3/28, 11pm on gradescope
3/31	normal distribution, Central limit, order statistics	4/3 is the Last day to drop with "W" Hw-8 is due 4/4, 11pm on gradescope
4/7	Joint distribution for continuous random variables, joint uniform distribution, marginal distribution for continuous,	Friday is Monday schedule
4/14	Joint moment for continuous, covariance for continuous, conditional distribution for continuous	4/18, Friday is Monday's schedule Hw-9 is due 4/18, 11pm on gradescope
4/21	Conditional moment for two continuous, Bivariate normal distribution	Monday is a Holiday
4/28	moment generating function, Probability generating function, transformations	
5/5	Transformations of two or more variables, final review	Hw-10 is due 5/7, 11pm on gradescope 5/9, Friday is the last day of classes
5/12	Final exam is on 5/13, 8-10am in LGRC A201	Final grade is due 5/22 midnight

Course information and communication

There is a corresponding Canvas course where you may find printable syllabus, PDF notes and other related course materials. If you have any questions, you may send my TA/me an email or schedule an appointment to talk about it.

Weights of Individual Assignments toward final grade

Teamwork (50% of final grading): since the second class, there is teamwork in each class. Teamwork questions are all from the textbook or SOA Exam P sample questions. The team leader organizes the team members to work together, asks each team member to sign the name on the solution paper, and then scans the signed solution into a PDF file with your iPhone, and submits it to gradescope.com before the class is over. Team leaders, when you submit the PDF solution to the gradescope, make sure to add the names of your team members too. Team leader and members, be sure to justify your answer. Answer without supporting work may receive zero credit. The following is a sample of teamwork solution sheet,

Team quiz sample and format

Team quiz date 1/29/25

Team leader: John Mayers, email: johnm@umass.edu

Note: members, you may contact the team leader via the email if you attend the quiz, but you did not get credit on the quiz, Members, it is your responsibility to sign your name on the solution sheet, if your name is not on the sheet, you should not get credits. If you attended the class but you forgot to sign the sheet, you should contact your team leader immediately. Unless the team leader agrees, you cannot add your name after the class.

Members: Steven Huang (handwritten signature, not typed name)

Lowes Bonstany (handwritten signature, not typed name)

Eric Mcmalon (handwritten signature, not typed name)

Quiz steps and solution:

Here is the support work shown below. The signature and the solution must be on the same page, and one page would be enough for both signature and the solution. The team leader can scan the page using your iPhone “notes” to a pdf file, the submit it to gradescope for grading. Answer without support work may receive 0 credit!

If you don't know how to use your iPhone to scan a file to a pdf file, you may look through the instruction at <https://www.macworld.com/article/232686/how-to-scan-documents-and-make-pdfs-using-notes-on-your-iphone-or-ipad.html>.

Homework (40% of final grading): We have 10 homework sets in total. I will post each homework set and its due date on Canvas course. You may discuss the homework solution with your team members, but you must submit the homework solution individually.

Final Exam (10% of final grading): we will hold a 2-hour final with 10 questions in total.

Online Practice SOA Exam P: if you want to practice more questions, you take Exam FM mock test at <http://q38101.questionwritetracker.com/EQERFHHR/>

Or practice [Exam P sample questions](#) and find their solutions [here](#).

Bonus: in the teamwork time, if you get the solution quickly, and you want to show your solution on board, you are very welcome, and you will get 2 bonus points (will directly add to your overall course grade) if your solution is correct and explained clearly. The bonus applies if and only if students attend the final exam.

Grading Scale

The final score is calculated by adding teamwork portion (50%), Homework portion (40%), final exam (10%) and bonus if any. The letter grade will be assigned by following score intervals.

A = 90 - 100%

A- = 87 - 89.99%

B+ = 83 - 86.99%

B = 79 - 82.99%

B- = 75 - 78.99%

C+ = 71 - 74.99%

C = 67 - 70.99%

C- = 63 - 66.99%

D+ = 59 - 62.99%

D = 55 - 58.99%

F = 0 - 54.99%

Exam Policy

Students who enroll in this course will have to take the final exam within the scheduled exam time frame. During the proctored final exam, students must follow proctoring rules and requirements set by the instructor for the course.

Please arrive 15 minutes early. You will not be admitted to the exam more than 30 minutes late.

- Do not bring any cheat sheets, formula sheet and class notes to the final exam.
- Bring your student ID to the exam.
- Calculator policy: you can only use a calculator approved by SOA during the exam.

Attendance and other class policies

Attendance: you must attend the course regularly to complete the assigned course work in the pointed period.

Special Accommodation: The University of Massachusetts Amherst is committed to providing an equal educational opportunity for all students. If you have a documented physical, psychological, or learning disability on file with Disability Services (DS), you may be eligible for reasonable academic accommodation to help you succeed in this course. If you have a documented disability that requires accommodation, please notify me within the first two weeks of the semester so that we may make appropriate arrangements. For further information, please visit Disability Services (<https://www.umass.edu/disability/>)

Makeup Policy: For Teamwork/homework, there is no extension or make-up unless you can provide me with an official document.

For the final exam, unless there is an unpredicted reason, you should provide me with an official document at least two weeks early to request a make-up exam.

Which case and where to get the official support documents for requesting make-up or an extension.

(1) If you have an exam (or a class) schedule conflicts with the regular exam, you should log on to the Spire page, go to "Student Home" and then to "Evening Exam Conflict". This will allow you to fill out a conflict form and submit it. Then the registrar will email your instructor who needs to provide a makeup exam.

(2) If you have a university trip for university business during the regular exam date, like an athletic competition or academic conference etc., you should ask your supervisor or your coach to write an explanation letter including his/her phone number to your instructor as the official written document. Your instructor may verify the event by phone call.

(3) If you have a religious observance on a regular exam date and CANNOT take the exam, you should write an explanation letter yourself and attach the invitation letter or relevant information as the official document.

(4) If you have a medical reason and CANNOT take the regular exam, you should ask a medical professional's statement including his/her phone number, which indicates that you were unable for medical reasons to take the scheduled exam. If the medical professional's statement is not given before the exam, your instructor may refuse your make-up request.

Electronic submission

It is students' responsibility to make sure any electronic submission goes through successfully (uploaded a PDF solution to gradescope, no blurry images, and questions and answers match) and check with the instructor or TA that the submission is successful. A practice session will be given on electronic submission during the first week of the semester.

Contingency plan

Before the semester, please test the technology that we use. If you have difficulty to access the Canvas and Zoom, please contact UMass OIT support <https://www.umass.edu/it/support> or if you have a trouble to access gradescope.com, you may contact help@gradescope.com.

Help

The best way to get help is to send my TA/me an email at jinguo@umass.edu to schedule an appointment during my office hours.

Incompletes

An Incomplete is possible only if: (1) you had a compelling personal reason, e.g., serious illness; (2) your work has clearly been passing; and (3) there is a good chance you'll complete the course with a passing grade within the allotted time. Thus, **failing work is no reason for an Incomplete.**

Title IX Statement

In accordance with Title IX of the Education Amendments of 1972 that prohibits gender-based discrimination in educational settings that receive federal funds, the University of Massachusetts Amherst is committed to providing a safe learning environment for all students, free from all forms of discrimination, including sexual assault, sexual harassment, domestic violence, dating violence, stalking, and retaliation. This includes interactions in person or online through digital platforms and social media. Title IX also protects against discrimination on the basis of pregnancy, childbirth, false pregnancy, miscarriage, abortion, or related conditions, including recovery. There are resources here on campus to support you. A summary of the available Title IX resources (confidential and non-confidential) can be found at the following link: <https://www.umass.edu/titleix/resources>. You do not need to make a formal report to access them. If you need immediate support, you are not alone. Free and confidential support is available 24 hours a day / 7 days a week / 365 days a year at the SASA Hotline 413-545-0800.

Academic Honesty Statement

Since the integrity of the academic enterprise of any institution of higher education requires honesty in scholarship and research, academic honesty is required of all students at the University of Massachusetts Amherst. Academic dishonesty is prohibited in all programs of the University. Academic dishonesty includes but is not limited to: cheating, fabrication, plagiarism, and facilitating dishonesty. Appropriate sanctions may be imposed on any student who has committed an act of academic dishonesty. Instructors should take reasonable steps to address academic misconduct. Any person who has reason to believe that a student has committed academic dishonesty should bring such information to the attention of the appropriate course instructor as soon as possible. Instances of academic dishonesty not related to a specific course should be brought to the attention of the appropriate department Head or Chair. Since students are expected to be familiar with this policy and the commonly accepted standards of academic integrity, ignorance of such standards is

not normally sufficient evidence of lack of intent
(http://www.umass.edu/dean_students/codeofconduct/acadhonesty/).

Reimburse your Exam P/FM/SRM expense.

The department will reimburse the full fee (up to \$500) for any of the first three exams that are successfully passed. For detailed information, you may look over the following page.

<https://www.math.umass.edu/undergraduate/actuarial-science#Exam%20Fund>