STAT 472: FAM-L
Long Term Fundamentals of Actuarial Mathematics
Fall 2025

Lecture: WALC B091 on Tues/Thurs 12:00 – 1:15 PM
Lab: SCHM 314 Wed 9:30-10:20 AM, 10:30-11:20 AM, or 11:30-12:20 PM

Office Hours: Tues/Thur 1:30 – 3:00 PM in MA 918

Contact Information

Instructor	Sally Ray
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Course Description
This 4-credit hour course will cover the learning objectives for the Society of Actuaries Examination FAM-L. The Learning Outcomes and Objectives can be found [here](#).

> Students enrolled in this course are eligible to earn University-Earned Credit (UEC) for the long term portion of SOA Exam FAM: Fundamentals of Actuarial Mathematics by achieving a minimum score of 85% based on the UEC grading scale listed later in the syllabus.

Communication
- *Email:* Main method of communication, please check daily
- *Brightspace:* Gradebook, group project submissions
- *Variate:* Homework

Textbooks
- *Required*: none
- *Optional*: Actuarial Mathematics for Life Contingent Risks, Third Edition by David C. M. Dickson, Mary R. Hardy, Howard R. Waters

Calculators
You may only use calculator(s) from the following list as these are the only calculators permitted for use by the Society of Actuaries. Use of any other calculator will result in disqualification from UEC credit and a 0 toward your University grade.

- BA II Plus
- BA II Plus Professional
- BA-35
- TI–30Xa or TI–30XA, same model just different casing, both approved

- TI-30X II (IIS solar or IIB battery)
- TI-30XS MultiView (or XB battery)

There are mortality and other tables that we will be using as part of class on a regular basis that will be passed out on the first day. It is expected that you will have these with you for class each day. Please bring your calculator(s) and tables to each class.

Class Structure

Students enrolled in this course are eligible to earn UEC credits for the long term side of SOA Exam FAM: Fundamentals of Actuarial Mathematics by achieving a minimum score of 85%. You will receive two separate grades for this course – one to count toward your University GPA and degree and another to count toward eligibility for UEC credit.

Evaluation will be based on a combination of the following:

- *Quizzes and Tests*
    - Closed book and closed notes
    - 6 quizzes, with lowest quiz score dropped
    - 2 cumulative tests – midterm and final
        - Midterm – 1 hour on Tuesday, October 21st in ME 1130 from 8:00 – 9:00 PM
        - Final – 2 hours during finals week

- *Homework*
    - Online using Variate.
    - Due Tuesdays and Fridays by 11:59 PM
    - One extension permitted – must notify 24 hours in advance of original due date
    - Lowest homework score will be dropped.

- *Group Projects*
    - 8 in-class group projects
    - 2 individual in-class projects; interim during 50-minute class, final during 75-minute class
    - All projects are excel-based and will require the use of a laptop.
    - Attendance required, no make-ups permitted for any reason.

- *One-on-One Meeting*
    - One required 15-minute meeting.
    - It is your responsibility to schedule this meeting. If you schedule and attend this meeting, you will earn 1% toward your final grade.
    - Google doc will be available for sign-up the first week of class.

Classroom Procedures and Attendance

This course follows Purdue's academic regulations regarding attendance, which states that students are expected to be present for every meeting of the classes in which they are enrolled. When conflicts or absences can be anticipated, such as for many University-sponsored activities and religious observations, you should inform me of the situation as far in advance as possible. For unanticipated or emergency absences when advance notification is not possible, contact me as soon as possible by email or phone.

For cases that fall under excused absence regulations, you or your representative should contact or go to the [Office of the Dean of Students (ODOS) website](#) to complete appropriate forms for instructor notification. Under academic regulations, excused absences may be granted by ODOS for cases of grief/bereavement, military service, jury duty, parenting leave, or emergent medical care. The processes are detailed, so plan ahead.

Grade Distribution

Final grades will be determined using the following weights. You will receive a separate grade for Purdue and to count toward UEC. Students achieving at least 85% under the UEC grade criterion below will be eligible for UEC credit.

University Letter Grade	
Quizzes	25%
Homework	5%
One-on-One Meeting	1%
Group Projects	8%
Interim Individual Project	2%
Final Individual Project	4%
Midterm	25%
Final	30%
Total	100%

UEC Grade	
Homework	20%
Midterm	30%
Final	50%
Total	100%

Grading Scale

Grades will be on a plus/minus scale as follows:

Below 60	60-62.9	63-66.9	67-69.9	70-72.9	73-76.9	77-79.9	80-82.9	83-86.9	87-89.9	90-92.9	93-96.9	97+
F	D-	D	D+	C-	C	C+	B-	B	B+	A-	A	A+

Make-up Policy

There will be no make-up exam permitted for the final. For the midterm and quizzes, the make-up policy varies between the UEC Grade and the University Letter grade.

UEC Grade

There will be no make-up exams under any circumstances for the purpose of obtaining UEC credit. If you do not attend the regularly scheduled Midterm and Final, you will not be eligible to earn UEC credit for this course.

University Letter Grade

Make-up exams are permitted if I am notified within 24 hours of the regularly scheduled exam time with the reason for the make-up request. Documentation for the request can be provided beyond the 24 hours, but initial contact with me must be made within 24 hours of the regular scheduled exam time. *Make-up exams are typically more difficult than the original exam and receive an automatic 10% deduction.* In the event the student has an official, university-excused absence through the Office of the Dean of Students, the automatic deduction will not apply.

Academic Integrity

Academic integrity is one of the highest values that Purdue University holds. Purdue has a student-initiated Purdue Honors Pledge you are expected to follow:

> "As a boilermaker pursuing academic excellence, I pledge to be honest and true in all that I do. Accountable together - we are Purdue."

Students can report issues of academic integrity that they observe, either through the Office of the Dean of Students (purdue.edu/odos), call 765-494-8778 or email integrity@purdue.edu .

Course Schedule

To satisfy the learning objectives and outcomes in the SOA syllabus, below is a rough schedule.

- Insurance coverages and retirement financial security programs
  - Week 1 – insurable interest, long term insurance coverages, defined benefit and defined contribution retirement plans
- Mortality models
  - Week 2 – parametric survival models, life tables, survival and mortality probabilities, force of mortality
  - Week 3 – complete and curtate expectation of life, actuarial notation for future lifetime distributions and moments
  - Week 4 – identify common features of population mortality curves, fractional age calculations using proper fractional age assumptions
  - Week 5 – select and ultimate mortality
- Present value random variables for long-term insurance coverages
  - Week 6 – identify present value random variables associated with life insurance, endowment based on annual 1/m-thly, and continuous payment frequency
  - Week 7 – probabilities, means, variances, and covariances of prior week's topics
  - Week 8 – identify present value random variables associated with annuity payments for single lives based on annual 1/m-thly, and continuous payment frequency
  - Week 9 – probabilities, means, variances, and covariances of prior week's topics
  - Week 10 – relationships between present value random variables and their expected values, effect of changes in underlying assumptions
- Premium and policy value calculation for long-term insurance coverages
  - Week 11 – future loss random variable
  - Week 12 – premiums based on equivalence principle, portfolio percentile principle
  - Week 13 – gross premium, net premium, modified net premium
  - Week 14 – effect of changes in underlying assumptions
  - Week 15 – modeling extra risk with age rating, constant addition to the force of mortality, constant multiple of rate of mortality

Quiz, Test, Project Schedule							
Week	Tues	Wed	Thurs	Week	Tues	Wed	Thurs
1				10		P5 – 10/29	
2	Q1 – 9/2			11	Q4 – 11/4	P6 – 11/5	
3		GD – 9/10		12		P7 – 11/12	
4	Q2 – 9/16	P1 – 9/17		13	Q5 – 11/18	P8 – 11/19	
5		P2 – 9/24		14	*No Class	Thanksgiving Break	
6	Q3 – 9/30	P3 – 10/1		15	Q6 – 12/2		FA – 12/4
7		P4 – 10/8		16			
8	Fall Break	IA – 10/15		17	Final: Date and Location TBD		
9	MT – 10/21						

Key: Q=Quiz, P=Project, MT=Midterm, GD=Group Discussion, IA=Interim Assessment, FA=Final Assessment

*No Class date is compensation day for underline evening midterm

Appendix

Use of External Resources

I am aware that there are many resources available for finding homework solutions. Some of them will give you the correct answer and others will not. Regardless, it is in your best interest to ensure that all of your work is your own since you will need to demonstrate your knowledge on quizzes and tests. Please learn from each other as you study, but make sure you independently master the material as well.

Students with Disabilities

Purdue University strives to make learning experiences accessible to all participants. If you anticipate or experience physical or academic barriers based on disability, you are encouraged to contact the Disability Resource Center at: drc@purdue.edu or by phone: 765-494-1247, as soon as possible.

If the Disability Resource Center (DRC) has determined reasonable accommodations that you would like to utilize in this class, you must send your Course Accommodation Letter to the instructor. Instructions on sharing your Course Accommodation Letter can be found by visiting: https://www.purdue.edu/drc/students/course-accommodation-letter.php. Additionally, you are strongly encouraged to contact the instructor as soon as possible to discuss implementation of your accommodations.

Zoom Instructions

If at any point we need to meet virtually, you may use this link: https://purdue-edu.zoom.us/j/9315176814. If you are ever prompted for a Personal Meeting ID, it is 931 517 6814.

Copyright

In general, notes are "considered to be 'derivative works' of the instructor's presentations and materials, and they are thus subject to the instructor's copyright in such presentations and materials." I consider class notes, tests, and quizzes to be derivative works and therefore copyrighted. Class notes, tests, and quizzes may not be sold, bartered, or even given to websites or other resources. Examples of such websites are Course Hero, Chegg, or Quizlet.

Drop/Add Calendars

In accordance with the university policy, the course drop deadlines have been set at the end of week 13 (November 25 for Fall 2025). For other important dates, you can access the Drop/Add calendars by visiting: https://purdue.edu/registrar/calendars

Once there, scroll down to locate the Drop/Add Refund & Deadline Calendars, or by following this direct link: https://catalog.purdue.edu/preview_program.php?catoid=18&poid=33633

Diversity and Inclusion Statement

In our discussions, structured and unstructured, we will explore a variety of challenging issues, which can help us enhance our understanding of different experiences and perspectives. This can be challenging, but in overcoming these challenges we find the greatest rewards. While we will design guidelines as a group, everyone should remember the following points:

- We are all in the process of learning about others and their experiences. Please speak with me, anonymously if needed, if you have concerns about aspects of/experiences in the course.
- Intention and impact are not always aligned, and we should respect the impact something may have on someone even if it was not the speaker's intention.
- We all come to the class with a variety of experiences and a range of expertise, we should respect these in others while critically examining them in ourselves."

This course, as with every course offered at Purdue, plays a part in creating and sustaining a welcoming campus where all students can excel. There are many initiatives in math and statistics departments and supported by the university focused on this goal, and this course is designed to take advantage of those resources. Learning experiences and assignments address diversity and inclusion, not because they are "topics," but because they are necessary to prepare students to be successful in a diverse, global environment.

We strive for equity, providing equal access and opportunity, and working to maximize student potential. This requires both instructor and students to identify and remove barriers that may prevent someone from full access or full participation. You can help by:

- Contacting me, anonymously if needed, if you see a potential barrier for someone or yourself in participating fully in the class. This might be a physical barrier such as access to technology or a personal situation.
- Suggesting ways in which members of our class can support each other. Virtual study groups and discussion boards are examples, but I encourage you to be creative in your ideas.
- Getting to know each other as contributing members of our learning community. Everyone has something to contribute, and while I designed the course to take advantage of the wealth of knowledge, expertise, and experience we bring together, I cannot do it well without your participation. There are many opportunities built into this course for this type of work. It is important we do it together.

Artificial Intelligence Policy

Students are expected to adhere to the guidelines provided by instructors for academic work so that no student gains an unfair advantage. Using or attempting to use unauthorized materials, information, study aids, notes, or any other device in any academic exercise will not be tolerated. Unauthorized materials may include anything which or anyone who gives a student assistance that has not been approved by the instructor in advance.

Additional Policies and Statements

The following can be found in Brightspace under "University Policies and Statements" or "Student Support and Resources":

- Nondiscrimination Statement
- Emergency Preparedness
- Violent Behavior Policy
- Accessibility and Academic Adjustments
- Mental Health, Wellness, and Basic Needs Security