

The University of Iowa
College of Liberal Arts and Sciences
Fall - 25'

Course Information

Course: ACTS:4130:0001- Quantitative Methods for Actuaries

Time: 1:30 – 2:20 MWF

Classroom: B60 PBSB (In-Person)

Department: Dept. of Statistics and Actuarial Science - www.stat.uiowa.edu

Course Website: Iowa Courses Online (ICON); access using your Hawk ID and password.

Instructor and Grader Information

Name: Prof. Nariankadu Shyamalkumar

Office: 233 SH

Phone: 319-335-1980

Email: shyamal-kumar@uiowa.edu

Office Hours: 2:30 – 3:30 MW (Zoom - Meeting ID 949 9189 7471) F (in 233SH)

Grader: Uthapala Gunathilake

Grader's Email: uthpala-gunathilake@uiowa.edu

Department Executive Officer

Name: Prof. Kung-Sik Chan

Office: 241 SH

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Course Description and Learning Outcomes

This is the first of an essentially three-course sequence, with the other two being ACTS:4180 and ACTS:4280. These courses, together, would cover the long-term insurance part of the SOA exam, titled Fundamentals of Actuarial Mathematics (FAM), and the syllabus of the SOA exam, Advanced Long-Term Actuarial Mathematics (ALTAM).

This course covers only the above-mentioned part of the SOA Exam FAM, specifically the parts related to the theoretical basis of contingent payment models and their application to insurance and other financial risks. Students will learn the following:

1. The key features of insurance coverages and retirement financial security programs.
2. The key concepts concerning parametric and non-parametric mortality models for individual lives.
3. The calculations on the present value random variables associated with benefits and expenses for long-term insurance coverages.

4. The use of the premium calculation processes for long-term insurance coverages, and gain the ability to explain the process.

This course is approved by the [SOA UEC](#) program for part of the SOA exam [Fundamentals of Actuarial Mathematics \(FAM\)](#). This course, together with ACTS:4150 (Spring offering), covers the syllabus for this exam.

Prerequisites: STAT:3100 with a minimum grade of B- and ACTS:3080 with a minimum grade of C+.

Textbook, References, & Calculators

Textbook: *Dickson, David CM and Hardy, Mary R and Waters, Howard R Actuarial mathematics for life contingent risks (Third Edition), 2020, Cambridge University Press , ISBN: 978-1-108-47808-3*

We will cover the following sections from the text:

- Chapters 1 and 2
- Chapter 3 (except Sections 4, 10, 11, 12)
- Chapters 4, 5, and 6

References:

1. Actuarial Mathematics, 2nd edition (1997), by N. L. Bowers, Jr., H. U. Gerber, J. C. Hickman (U Iowa MS 1952, PhD 1961), D. A. Jones (U Iowa MS 1956, PhD 1959), and C. J. Nesbitt, SOA.
2. Life Contingencies, 2nd edition (1967), by C. W. Jordan, Jr., Society of Actuaries, Chicago.
3. Life Insurance Mathematics, 3rd edition (1997), by H. U. Gerber (a book published by Springer for the Swiss Association of Actuaries). Available [here](#) for purchase.
4. The Mathematics of Life Insurance: A Practical Guide to the Application of Insurance Principles (1965), by W. O. Menge and C. H. Fischer (U Iowa MS 1930, PhD 1932), Ulrich's, Ann Arbor, MI. This book does not use calculus.
5. Fundamentals of Actuarial Mathematics, 3rd edition (2015), by S. D. Promislow, Wiley.
6. Stochastic Models in Life Insurance (2012), by Michael Koller (a book published by Springer for the European Actuarial Academy). Available [here](#) for free download.

Table 1: Tentative Schedule

Week(s)	Topic	Chapter
1	Long-Term Insurance Coverage and Retirement Financial Security Programs	1
2-3	Survival Models	2
4-5	Life Tables and Selection	3
6-9	Insurance Benefits	4
10-11	Annuities	5
12-15	Premium Calculations	6

Calculator: The following is adapted from the statement on the SOA website available [here](#). Only the below-listed models of Texas Instruments calculators are approved for SOA exams, and hence for the quizzes, and exams for this class:

- BA-35
- BA II Plus
- BA II Plus Professional TI – 30Xa or TI – 30XA
- TI-30X II (IIS solar or IIB battery)
- TI-30XS MultiView (or XB battery)

Candidates may bring more than one calculator for the exam along with extra batteries, provided each calculator is on the approved list. Calculator covers and instructions will not be permitted in the exam. Please note that upon entering the exam room, candidates using the BA II Plus, BA II Plus Professional Edition, TI-30X IIS, TI-30XB (solar or battery), or TI-30XS MultiView (or XB battery) must demonstrate to the instructor that the memory has been cleared. The BA II Plus and BA II Plus Professional Edition will reset to their factory default settings when cleared. No other calculators may be available for those who fail to bring an approved model.

Course Materials

This course will post lecture notes and other documents on the course website at icon.uiowa.edu.

Evaluation

Class Attendance

Attendance is not mandatory. It must be noted, however, that students who are frequently absent cannot expect the instructor to assist them in making up the missed material during office hours or via email.

Assignments - 20%

The assignments will primarily be given on Fridays and are expected to be turned in by the following Saturday at midnight. Assignments must be scanned and uploaded to ICON to maintain a complete grading record, especially since this is a UEC course. Since I give an extra day on Saturday for submission, late assignments will **not** be accepted for any reason.

Biweekly Quizzes - 15%

Seven quizzes will be given - typically on Mondays - on 9/8, 9/22, 10/6, 10/27, 11/10, 11/21 (**Friday**), and 12/8. The lowest score will be dropped for grading purposes. Hence, missed quizzes will not be made up for any reason.

Midterm Exam- 25%

This is a closed-book and closed-note 120-minute evening exam scheduled for 10/15/25 at 6:30-8:30 pm in [W151 PBB](#). The exam will consist of SOA Exam-FAM-style questions, but will be set as a written answer exam instead of a multiple-choice one.

Final Exam - 40%

This is a closed-book, closed-note 2-hour exam consisting of SOA Exam-FAM-style questions but set as a written-answer exam instead of a multiple-choice one. It will be scheduled during the final exam week. The sample exam provided by the SOA, available [here](#), is a good reference.

Missed Exams

Missed exams can be made up only for university-approved reasons. Unless the reason for the absence prohibits providing advanced notice, the student must provide the instructor with the required documentation with sufficient advance notice. In the event of illness, the student should inform the instructor by the end of the exam day, unless the illness is so severe that it prevents such a notification.

Scoring for SOA UEC Credit

To determine the granting of credit for the SOA Exam FAM under the SOA UEC program, the final will comprise 80% of the UEC score, and the assignments will comprise the remaining 20%. A minimum UEC score of 85% is required in each of ACTS:4130 and ACTS:4150 to obtain the credit. Note that your midterm exam contributes to your University of Iowa grade, but not to the UEC score.

Grade Scale for U of Iowa Course Final Grade

Final grades will be assigned according to the following tentative scale:

As	85 – 100
Bs	70 – 84
Cs	55 – 69
Ds	40 – 54
Fs	0 – 39

The plus/minus grades will be used, and an A+ may be awarded to the top performer in the class who also makes significant contributions to in-class discussions. The exact scale will likely differ between undergraduate and graduate students, with the undergraduate scale resulting in an equal or higher letter grade for the same cumulative score.

Student Complaints

Students with a complaint about a grade or a related matter should first discuss the situation with the instructor and/or the course supervisor (if applicable), and finally with the DEO (Chair) of the department, school or program offering the course. Sometimes students will be referred to the department or program's Director of Undergraduate Studies (DUS) or Director of Graduate Studies (DGS).

Undergraduate students should contact [CLAS Undergraduate Programs](#) for support when the matter is not resolved at the previous level. Graduate students should contact the [CLAS Graduate Affairs Manager](#) when additional support is needed.

Course's College (Administrative Home)

The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the policies and procedures for its courses. For undergraduate students, this means CLAS governs the add and drop deadlines, academic misconduct policies, and other undergraduate policies and procedures. Graduate students, however, must adhere to the [academic deadlines set by the Graduate College](#).

Drop Deadline for this Course

You may drop an individual course before the drop deadline; after this deadline you will need collegiate approval. You can look up the drop deadline for this course [here](#). When you drop a course, a “W” will appear on your transcript. The mark of “W” is a neutral mark that does not affect your GPA. To discuss how dropping (or staying in) a course might affect your academic goals, please contact your Academic Advisor. **Directions for adding or dropping a course and other registration changes can be found on the [Registrar's website](#). Undergraduate students can find policies on dropping CLAS courses [here](#).** Graduate students should adhere to the [academic deadlines](#) and policies set by the Graduate College.

UI Email

Students are responsible for all official correspondences sent to their UI email address (uiowa.edu) and must use this address for any communication with instructors or staff in the UI community. For the privacy and the protection of student records, UI faculty and staff can only correspond with UI email addresses.

Absences from Class

University regulations require that students be allowed to make up examinations which have been missed due to illness, religious holy days, military service obligations, including

service-related medical appointments, jury duty, or other unavoidable circumstances or other university-sponsored activities. Students should work with their instructors regarding making up other missed work, such as assignments, quizzes, and classroom attendance.

Absences for Religious Holy Days

The university is prepared to make reasonable accommodations for students whose religious holy days coincide with their classroom assignments, test schedules, and classroom attendance expectations. Students must notify their instructors in writing of any such religious holy day conflicts or absences within the first few days of the semester or session, and no later than the third week of the semester. If the conflict or absence will occur within the first three weeks of the semester, the student should notify the instructor as soon as possible. See [Policy Manual 8.2 Absences for Religious Holy Days](#) for additional information.

Absences for Military Service Obligations

Students absent from class or class-related requirements due to U.S. veteran or U.S. military service obligations (including military service–related medical appointments, military orders, and National Guard Service obligations) shall be excused without any grading adjustment or other penalty. Instructors shall make reasonable accommodations to allow students to make up, without penalty, tests and assignments they missed because of veteran or military service obligations. Reasonable accommodations may include making up missed work following the service obligation; completing work in advance; completing an equivalent assignment; or waiver of the assignment without penalty. In all instances, students bear the responsibility to communicate with their instructors about such veteran or military service obligations, to meet course expectations and requirements.

Accommodations for Students with Disabilities

The University is committed to providing an educational experience that is accessible to all students. If a student has a diagnosed disability or other disabling condition that may impact the student's ability to complete the course requirements as stated in the syllabus, the student may seek accommodations through [Student Disability Services](#) (SDS). SDS is responsible for making [Letters of Accommodation \(LOA\)](#) available to the student. **The student must provide an LOA to the instructor as early in the semester as possible, but requests not made at least two weeks prior to the scheduled activity for which an accommodation is sought may not be accommodated.** The LOA will specify what reasonable course accommodations the student is eligible for and those the instructor should provide. Additional information can be found on the [SDS website](#).

Free Speech and Expression

The University of Iowa supports and upholds the First Amendment protection of freedom of speech and the principles of academic and artistic freedom. We are committed to open inquiry, vigorous debate, and creative expression inside and outside of the classroom. Visit the [Free Speech at Iowa website](#) for more information on the university's policies on free speech and academic freedom.

Non-discrimination Statement

The University of Iowa prohibits discrimination in employment, educational programs, and activities on the basis of race, creed, color, religion, national origin, age, sex, pregnancy (including childbirth and related conditions), disability, genetic information, status as a U.S. veteran, service in the U.S. military, sexual orientation, gender identity, or associational preferences. The university also affirms its commitment to providing equal opportunities and equal access to university facilities. For additional information on nondiscrimination policies, contact the Senior Director, Office of Civil Rights Compliance, the University of Iowa, 202 Jessup Hall, Iowa City, IA 52242-1316, 319-335-0705, ui-ocrc@uiowa.edu. Although not required, students have the option to share their pronouns and chosen/preferred names in class and through [MyUI](#). Instructors and advisors can find information about a student's chosen/preferred name in MyUI.

Classroom Expectations

Students are expected to comply with University policies regarding appropriate classroom behavior as outlined in the [Code of Student Life](#). While students have the right to express themselves and participate freely in class, it is expected that students will behave with the same level of courtesy and respect in the virtual class setting (whether asynchronous or synchronous) as they would in an in-person classroom. Failure to follow behavior expectations as outlined in the [Code of Student Life](#) may be addressed by the instructor and may also result in discipline under the [Code of Student Life](#) policies governing E.5 Disruptive Behavior or E.6 Failure to Comply with University Directive.

Class Recordings

The unauthorized video or audio recording of academic activities (e.g., lectures, course discussions, office hours, etc.) by a student is prohibited. Students with a reasonable accommodation for recording approved by Student Disability Services should notify each instructor and provide the Letter of Accommodation prior to using the accommodation. A student may record classroom activities with prior written permission from the instructor and notice to other students in the class that audio or video recording may occur. Any and all classroom recording must be for personal academic use only. The distribution, sharing, sale, or posting of recordings on the internet (including social media), in whole or in part, is prohibited and doing so may be a violation of the Code of Student Life and/or state or federal privacy, copyright, or other laws.

Academic Honesty and Misconduct

All students in CLAS courses are expected to abide by the [college's standards of academic honesty](#). Undergraduate academic misconduct must be reported by instructors to CLAS according to [these procedures](#). Graduate academic misconduct must be reported to the Graduate College according to Section F of the [Graduate College Manual](#).

Date and Time of the Final Exam

The [final examination date and time](#) will be announced by the Registrar generally by the fifth week of classes, and it will be announced on the course ICON site once it is known. **Do not plan your end of the semester travel plans until the final exam schedule is made public. It is your responsibility to know the date, time, and place of the final exam.** According to the Registrar's final exam policy, students **have a maximum of two weeks after the announced final exam schedule** to request a change if an exam conflict exists or if a student has more than two exams scheduled for the same day (see the [policy](#) here).

Student Support Resources and Related Policies

Academic Support for this Course

Please see the first page of the syllabus for office hour details. If these hours or modalities do not work, I am open to meet on an appointment basis at a mutually convenient place and time. Seeking timely help is key as availing of help solely before exams can be quite ineffective.

Mental Health

Students are encouraged to be mindful of their mental health and seek help as a preventive measure or if feeling overwhelmed and/or struggling to meet course expectations. Students are encouraged to talk to their instructor for assistance with specific class-related concerns. For additional support and counseling, students are encouraged to contact University Counseling Service (UCS). Information about UCS, including resources and how to schedule an appointment, can be found at counseling.uiowa.edu. Find out more about UI mental health services at: mentalhealth.uiowa.edu.

Basic Needs and Student Support

It can be difficult to maintain focus and be present if you are experiencing challenges with meeting basic needs or navigating personal crisis situations. The Office of the Dean of

Students can help. Contact us for one-on-one support, identifying options, and to locate and access basic needs resources (such as food, rent, childcare, etc.).

[Student Care and Assistance](#)

132 IMU

dos-assistance@uiowa.edu

319-335-1162

Basic Needs info:

- [Food Pantry at Iowa](#)
- [Clothing Closet](#)
- [Basic Needs and Support Resources](#)

Sexual Harassment/Sexual Misconduct and Supportive Measures

The University of Iowa prohibits all forms of sexual harassment, sexual misconduct, and related retaliation. The [Policy on Sexual Harassment and Sexual Misconduct](#) governs actions by students, faculty, staff and visitors. Incidents of sexual harassment or sexual misconduct can be reported to the [Office of Civil Rights Compliance](#) or to the [Department of Campus Safety](#). Students impacted by sexual harassment or sexual misconduct may be eligible for academic supportive measures and can learn more by [contacting the Office of Civil Rights Compliance](#). Information about confidential resources and videos explaining these resources can be found on the [Office of Civil Rights Compliance website](#).

Conflict Resolution

The Office of the Ombudsperson is a confidential, impartial, informal, and independent resource for any member of the university community with a problem or concern. The Office of the Ombudsperson offers a safe place to discuss conflicts or concerns. Students are encouraged to reach out for assistance. The office will brainstorm with students to help identify options, answer any questions, and provide referrals to other offices as appropriate. More information about the Office of the Ombudsperson, including how to schedule an appointment, can be found at ombudsperson.org.uiowa.edu.