The University of Iowa
College of Liberal Arts and Sciences
Department of Statistics and Actuarial Science
Course Outline for ACTS:4130 Quantitative Methods for Actuaries Fall Semester 2023
MWF 1:30 to 2:20 pm   15 SH

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Office Hours: 2:30 to 3:30 pm TWF; or by appointment.
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Co-requisites: ACTS:3080 and STAT:4100 or 5100. Calculus and probability theory are used extensively in this course.
The College of Liberal Arts and Sciences (CLAS) is the home of this course, and CLAS governs the add and drop deadlines, the "second-grade only" option (SGO), academic misconduct policies, and other undergraduate policies and procedures. Other UI colleges may have different policies.

The required textbook is *Actuarial Mathematics for Life Contingent Risks*, 3rd ed (2020), by D.C.M. Dickson, M.R. Hardy, and H.R. Waters, Cambridge University Press. The goal of the course is to cover its Chapters 1 to 6; if possible, also portions of Chapter 7. This book is also the textbook for ACTS:4180 and 4280, and for SOA Exams FAM and ALTAM.

Below are some useful references.
- *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. We shall refer to this book frequently. If you want a paper copy of this book, I shall give you one.
- *Solutions Manual for Actuarial Mathematics for Life Contingent Risks*, 3rd edition, by D. C. M. Dickson, M. R. Hardy, and H. R. Waters, Cambridge University Press.
- *Life Contingencies*, 2nd edition (1967), by C. W. Jordan, Jr., Society of Actuaries, Chicago.
- *Life Insurance Mathematics*, 3rd edition (1997), by H. U. Gerber (a book published by Springer for the Swiss Association of Actuaries). http://link.springer.com/book/10.1007/978-3-662-03460-6
- *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.
- *Models for Quantifying Risk*, 6th edition (2014), by S. J. Camilli, I. Duncan, and R. L. London, ACTEX Publications, and its *Solutions Manual*.
- *Fundamentals of Actuarial Mathematics*, 3rd edition (2015), by S. D. Promislow, Wiley.
- *Stochastic Models in Life Insurance* (2012), by Michael Koller (a book published by Springer for the European Actuarial Academy). Using a campus connection, you can download the entire book for free http://link.springer.com/book/10.1007/978-3-642-28439-7

There will be two evening (6:30 to 8:30 pm) midterm exams, held on October 3 (Tuesday) and November 10 (Friday), in 140 SH. All exams are closed book and closed note; no crib sheets are allowed. You are to use a SOA-approved calculator.
Tentatively, your numerical grade will be calculated by the formula,
        HW 10% + Midterm Exams 25% + 25% + Final Exam 40%,
and translated to a University of Iowa grade as follows:
Undergraduates F[0, 40); D−[40, 45); D[45, 50); D+[50, 55); C−[55, 60); C[60, 65); C+[65, 70); B−[70, 75); B[75, 80); B+[80, 85); A−[85, 90); A[90, 95); A+[95, 100]
Graduate students F[0, 46); D−[46, 50.5); D[50.5, 55); D+[55, 59.5); C−[59.5, 64); C[64, 68.5); C+[68.5, 73); B−[73, 77.5); B[77.5, 82); B+[82, 86.5); A−[86.5, 91); A[91, 95.5); A+[95.5, 100]

The formula for SOA's UEC score is: HW 20% + Final Exam 80%. To get FAM credit from the SOA, you need to achieve 85% or better in ACTS:4130 **and** in ACTS:4150. Your midterm exam marks contribute to your University of Iowa grade, but not to the SOA UEC score.

The **final** examination, to be held during the week of December 11, is **cumulative** (covering material from throughout the course).

Below is a tentative teaching schedule.

Dates	Topics	*AMLCR* 3rd ed by Dickson et al.	Corresponding Chapters and Sections in *Actuarial Math.* by Bowers et al.
8/21	Intro. to Life and Long-term Health Insurance	Chapter 1	
8/23, 25, 28, 30; 9/1, 6	Survival Models	Chapter 2	Chapter 3
9/8, 11, 13, 15, 18, 20, 22	Life Tables and Selection	Sections 3.1 to 3.10	Chapter 3
9/25, 27, 29	Life Insurance Benefits	Chapter 4	Chapter 4
10/3	Midterm 1		
10/4, 6, 9, 11, 13, 16, 18, 20	Life Insurance Benefits	Chapter 4	Chapter 4
10/23, 25, 27, 30; 11/1, 3, 6, 8	Life Annuities. Derivation of the Euler-Maclaurin Formula. Show $\beta(m) = (I^{(m)}\ddot{s})\frac{(m)}{(m-1)/m|}$; $\alpha(m) = \beta(m) + (D^{(m)}\ddot{a})\frac{(m)}{1|}$; $\ddot{a}_x^{(-m)} = a_x^{(m)}$; $a_x^{(-m)} = \ddot{a}_x^{(m)}$.	Chapter 5	Sections 5.1 to 5.4
11/10	Midterm 2		
11/13, 15, 17, 27, 29; 12/1, 4	Premium Calculation. International Actuarial Notation. Jewell's Inequality.	Chapter 6	Sections 6.1 to 6.4 & 6.6
12/6, 8	Introduction to Reserves	Section 7.2	Chapter 7
12/11 to 15	Final Exam Week		

Academic Honesty and Misconduct
All students in CLAS courses are expected to abide by the CLAS Code 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.

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 Director or Chair of the school, department, or program offering the course.
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 Associate Dean for Graduate Education and Outreach and Engagement when additional support is needed.

Drop Deadline for this Course
You may drop an individual course before the 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. 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 and withdrawing here. Graduate students should adhere to the academic deadlines and policies set by the Graduate College.

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 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 in one day (see the policy here)**.**

Attendance and Absences
University regulations require that students be allowed to make up examinations that have been missed due to illness, religious holy days, military service obligations (including service-related medical appointments), or other unavoidable circumstances or University-sponsored activities. Students with UI-authorized activities must discuss their absences with the instructor as soon as possible. Religious obligations must be communicated within the first three weeks of classes.

Exam Policies

Communication: 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.

Mental Health Resources and Student Support
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.

Student Care and Assistance provides assistance to University of Iowa students who are experiencing a variety of crisis and emergency situations, including but not limited to medical issues, family emergencies, unexpected challenges, and sourcing basic needs such as food and shelter. More information on the resources related to basic needs can be found at basicneeds.uiowa.edu/resources/. Students are encouraged to contact Student Care & Assistance in the Office of the Dean of Students (Room 135 IMU, dos-assistance@uiowa.edu, or 319-335-1162) for support and assistance with resources.

University Policies

Accommodations for Students with Disabilities
The University is committed to providing an educational experience that is accessible to all. 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. **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
Absences for Religious Holy Days
Classroom Expectations
Non-discrimination
Sexual Harassment/Misconduct and Supportive Measures
Sharing of Class Recordings