

The University of Iowa
College of Liberal Arts and Sciences
Department of Statistics and Actuarial Science
ACTS:4280 (22S:182) Life Contingencies II Fall Semester 2017
5:00-6:15 PM MTWTh 112 MH

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Office Hours: 3:30–5 PM Monday and Wednesday, or by appointment

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Prerequisites: Multivariate calculus and linear algebra, STAT:4100 (22S:153) or STAT:5100 (22S:193), **and** a grade of C+ or better in ACTS:4180 (22S:181). Some knowledge of differential equations will be helpful.

This is an off-cycle course. The drop date is October 5.

This course is based on the syllabus for the professional examination “Models for Life Contingencies (MLC)” given by the Society of Actuaries (Fall 2017 and Spring 2018). (Beginning Fall 2018, the examination will be called Long-Term Actuarial Mathematics (LTAM), with a modified syllabus.)

The **required textbooks** are

- *Actuarial Mathematics for Life Contingent Risks*, 2nd edition, by D. C. M. Dickson, M. R. Hardy, and H. R. Waters (2013), Cambridge University Press. **The MLC syllabus is Chapters 1 to 13, excluding Section 11.5** “Monte Carlo simulation.” Note that “[e]xercises are considered part of the required readings.”
- *Actuarial Mathematics*, 2nd edition, by N. L. Bowers, H. U. Gerber, J. C. Hickman, D. A. Jones, and C. J. Nesbitt (1997), Society of Actuaries.

Other references:

- “Notation and Terminology used on Exam MLC (September 19, 2016 version)”
<http://www.soa.org/Files/Edu/2016/fall/edu-2016-fall-exam-mlc-notation.pdf>
- *Solutions Manual for Actuarial Mathematics for Life Contingent Risks*, 2nd edition, by D. C. M. Dickson, M. R. Hardy, and H. R. Waters, Cambridge University Press.
- *Life Insurance Mathematics*, 3rd edition, 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>
- *Models for Quantifying Risk*, 6th edition, by S.J. Camilli, I. Duncan, and R. L. London, ACTEX Publications, and its *Solutions Manual*.

- *Stochastic Models in Life Insurance* 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>
- *Introduction to Insurance Mathematics: Technical and Financial Features of Risk Transfers* by Annamaria Olivieri and Ermanno Pitacco . You can download it for free from <https://link.springer.com/book/10.1007/978-3-642-16029-5>

There will be five (5) two-hour evening exams, all held in 40 SH, 6:30 to 8:30 pm, August 25 (Friday), September 8 (Friday), September 22 (Friday), October 13 (Friday), and October 25 (Wednesday). **You are to use an official SOA calculator.** Tentatively, the final grade (HW 8%; 1st exam 8%; 2nd to 4th exam 20% each; 5th exam 24%) will be assigned as follows:

Undergrads 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]

Important dates: (i) **SOA's MLC Examination will be given on Friday, October 27**, 8:30 am to 12:45 pm. The registration deadline is Monday, September 25.
 (ii) The fifth *Midwest Actuarial Science Convention* will be held on September 29 (Friday) and 30 (Saturday).
 (iii) The *Actuarial Science, Insurance and Risk Management Job Fair* will be held Wednesday, October 4, 1:00 pm to 4:00 pm.

A Puzzle: For a fully continuous whole life insurance of 1 on (x) , the net annual premium, π , is determined using (6.1) on page 148 of *AMLCR* by Dickson et al.,

$$E[v^{T_x}] = E[\pi \times \bar{a}_{T_x}].$$

Thus, $\pi = \frac{E[v^{T_x}]}{E[\bar{a}_{T_x}]} = \frac{\bar{A}_x}{\bar{a}_x}$. The international actuarial symbol for π is $\bar{P}(\bar{A}_x)$; see the first entry in

Table 6.2.1 on page 173 of *AM* by Bowers et al.

If, instead of equating expected present values, we equate expected values at the moment of death, then the resulting equation is

$$1 = E[\pi \times \bar{s}_{T_x}].$$

However, these two π 's are not the same unless the interest rate is zero. **Why?**

One way to show that the two π 's cannot be the same is to use *Jensen's inequality*. If you do not remember Jensen's inequality, see the first sentence in Exercise 5.18 on page 142 of *AMLCR*.

(In that sentence, the clause "whose first derivative is positive" is of no use and can be deleted.)

In fact, you can prove that one of two π 's is always larger than the other.

Administrative Home

The College of Liberal Arts and Sciences is the administrative home of this course and governs matters such as the add/drop deadlines, the second-grade-only option, and other related issues. Different colleges may have different policies. Questions may be addressed to 120 Schaeffer Hall, or see the CLAS Academic Policies Handbook at <https://clas.uiowa.edu/students/handbook>.

Electronic Communication

University policy specifies that students are responsible for all official correspondences sent to their University of Iowa e-mail address (@uiowa.edu). Faculty and students should use this account for correspondences ([Operations Manual, III.15.2](#), k.11).

Accommodations for Disabilities

The University of Iowa is committed to providing an educational experience that is accessible to all students. A student may request academic accommodations for a disability (which includes but is not limited to mental health, attention, learning, vision, and physical or health-related conditions). A student seeking academic accommodations should first register with Student Disability Services and then meet with the course instructor privately in the instructor's office to make particular arrangements. Reasonable accommodations are established through an interactive process between the student, instructor, and SDS. See <https://sds.studentlife.uiowa.edu/> for information.

Nondiscrimination in the Classroom

The University of Iowa is committed to making the classroom a respectful and inclusive space for all people irrespective of their gender, sexual, racial, religious or other identities. Toward this goal, students are invited to optionally share their preferred names and pronouns with their instructors and classmates. The University of Iowa prohibits discrimination and harassment against individuals on the basis of race, class, gender, sexual orientation, national origin, and other identity categories set forth in the University's Human Rights policy. For more information, contact the Office of Equal Opportunity and Diversity, diversity@uiowa.edu, or visit diversity.uiowa.edu.

Academic Honesty

All CLAS students or students taking classes offered by CLAS have, in essence, agreed to the College's [Code of Academic Honesty](#): "I pledge to do my own academic work and to excel to the best of my abilities, upholding the [IOWA Challenge](#). I promise not to lie about my academic work, to cheat, or to steal the words or ideas of others; nor will I help fellow students to violate the Code of Academic Honesty." Any student committing academic misconduct is reported to the College and placed on disciplinary probation or may be suspended or expelled ([CLAS Academic Policies Handbook](#)).

CLAS Final Examination Policies

The final examination schedule for each class is announced by the Registrar generally by the fifth week of classes. Final exams are offered only during the official final examination period. No exams of any kind are allowed during the last week of classes. All students should plan on being at the UI through the final examination period. Once the Registrar has announced the date, time, and location of each final exam, the complete schedule will be published on the Registrar's web site and will be shared with instructors and students. It is the student's responsibility to know the date, time, and place of a final exam.

Making a Suggestion or a Complaint

Students with a suggestion or complaint should first visit with the instructor (and the course supervisor), and then with the departmental DEO. Complaints must be made within six months of the incident (CLAS [Academic Policies Handbook](#)).

Understanding Sexual Harassment

Sexual harassment subverts the mission of the University and threatens the well-being of students, faculty, and staff. All members of the UI community have a responsibility to uphold this mission and to contribute to a safe environment that enhances learning. Incidents of sexual harassment should be reported immediately. See the UI [Office of the Sexual Misconduct Response Coordinator](#) for assistance, definitions, and the full University policy.

Reacting Safely to Severe Weather

In severe weather, class members should seek appropriate shelter immediately, leaving the classroom if necessary. The class will continue if possible when the event is over. For more information on Hawk Alert and the siren warning system, visit the [Department of Public Safety website](#).