
THE UNIVERSITY OF IOWA
College of Liberal Arts and Sciences
Department of Statistics and Actuarial Science

ACTS:4130 (22S:174) Quantitative Methods for Actuaries

Spring 2015
4:30 p.m. - 5:20 p.m., MWF, at 15 SH

1 Contact information

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2 Course description and objectives

This foundation course for B.S. and M.S. in Actuarial Science students consists of two separate parts:

Part 1. Financial derivatives (approximately two-third of the course)

The main objective of this course is to prepare you adequately for the second part of the SOA Exam FM (Financial Mathematics), namely, the financial economics portion, which accounts for 20-35% of the entire exam according to the exam syllabus.

Part 2. Baby life contingencies (approximately one-third of the course)

In the second part, we shall switch gears and develop a probabilistic framework that is crucial to valuing “contingent” cash flows in SOA Exam MLC (Models for Life Contingencies). The probabilistic tools we learn in this course will be applied and further enhanced in the two follow-up courses, ACTS:4180 (22S:181) “Life Contingencies I” and ACTS:4280 (22S:182) “Life Contingencies II”, to value typical insurance products.

After taking this course, you are expected to:

- Develop a conceptual (i.e. non-mathematical) understanding of different kinds of derivatives, in particular, forwards and options.
- Design an arbitrage strategy to exploit mispricing in the market.
- Take and, most importantly, pass Exam FM with considerable ease.
- Go on to advanced courses on life contingencies and mathematical finance with strong confidence.

3 Exam FM

In 2015, Exam FM will be offered via computer-based testing (CBT) in February (17-28), April (9-20), June (11-22)ⁱ, August (6-17), October (15-26) and December (8-19). The registration deadlines are January 8, March 2, May 4, June 29, September 7 and October 29 respectively. More details of Exam FM (e.g. syllabus, sample exam questions, etc.) can be found at <https://www.soa.org/education/exam-req/edu-exam-fm-detail.aspx>.

ⁱI recommend taking Exam FM in June shortly after completing this course.

4 Texts

There are no required textbooks in this course. We shall follow closely the course lecture notes, which will be made available on ICON. The notes not only address all important topics required in the financial economics portion of Exam FM, but also include a wide variety of examples for exam preparation.

4.1 Recommended texts

Here are two recommended texts available in the university bookstore:

1. *McDonald, R.L., 2013. Derivatives Markets (Third Edition). Pearson.*

This is the official textbook for the Financial Economics portion of Exam FM as well as Exam MFE. We shall cover the following required sections in the SOA Exam FM syllabus:

Chapter 1: Introduction to Derivatives

Chapter 2: An Introduction to Forwards and Options

Chapter 3: Insurance, Collars, and Other Strategies

Chapter 4: Introduction to Risk Management (Sections 4.1-4.4)

Chapter 5: Financial Forwards and Futures (Sections 5.1-5.4 and Appendix 5.B)

Chapter 8: Swaps (Sections 8.1-8.3)

In addition, part of the following chapter from the Exam MFE syllabus will be covered:

Chapter 9: Parity and Other Option Relationships

Pearson has published *Student Solutions Manual to Derivatives Markets*, which provides solutions to all even-numbered end-of-chapter questions in the text.

2. *Dickson, D.C.M., Hardy, M.R., Waters, H.R., 2013. Actuarial Mathematics for Life Contingent Risks (Second Edition). Cambridge University Press.*

This is the official textbook for Exam MLC. We shall cover:

Chapter 2: Survival models

Chapter 3: Life tables and selection

There is a solution manual (*Solutions Manual for Actuarial Mathematics for Life Contingent Risks*) that accompanies this book.

4.2 Study manuals

You may also make use of study manuals available in the market, e.g.:

1. Cherry, H., Gorvett, R., 2011. ASM Study Manual for Exam FM/Exam 2 (11th Edition)
2. Li, J., Ng, A. 2015. ACTEX MLC Study Manual (Spring 2015 Edition)
3. Weishaus, A., 2014. ASM Study Manual for Exam MLC (14th Edition Second Printing)
4. Weishaus, A., 2014. ASM Study Manual for Exam MFE (9th Edition Eighth Printing)

5 Tentative teaching schedule

Teaching Week	Lecture	Date	Contents
Part I: Financial Derivatives			
1	—	January 19, 2015 (Mon)	(University Holiday)
	L01	January 21, 2015 (Wed)	Chapter 1
	L02	January 23, 2015 (Fri)	Chapter 1
2	L03	January 26, 2015 (Mon)	Chapter 1
	L04	January 28, 2015 (Wed)	Chapter 1
	L05	January 30, 2015 (Fri)	Chapter 2
3	L06	February 2, 2015 (Mon)	Chapter 2
	L07	February 4, 2015 (Wed)	Chapter 2
	L08	February 6, 2015 (Fri)	Chapter 2
4	L09	February 9, 2015 (Mon)	Chapter 2
	L10	February 11, 2015 (Wed)	Chapter 2
	L11	February 13, 2015 (Fri)	Chapter 2
5	L12	February 16, 2015 (Mon)	Chapter 3
	L13	February 18, 2015 (Wed)	Chapter 3
	L14	February 20, 2015 (Fri)	Chapter 3
6	L15	February 23, 2015 (Mon)	Chapter 3
	L16	February 25, 2015 (Wed)	Chapter 3
	L17	February 27, 2015 (Fri)	Midterm Exam 1
7	L18	March 2, 2015 (Mon)	Chapter 4
	L19	March 4, 2015 (Wed)	Chapter 4
	L20	March 6, 2015 (Fri)	Chapter 4
8	L21	March 9, 2015 (Mon)	Chapter 4
	L22	March 11, 2015 (Wed)	Chapter 4
	L23	March 13, 2015 (Fri)	Chapter 4

—	—	March 16, 2015 (Mon)	(Spring Break)
	—	March 18, 2015 (Wed)	(Spring Break)
	—	March 20, 2015 (Fri)	(Spring Break)
9	L24	March 23, 2015 (Mon)	Chapter 5
	L25	March 25, 2015 (Wed)	Chapter 5
	L26	March 27, 2015 (Fri)	Chapter 5
10	L27	March 30, 2015 (Mon)	Chapter 6
	L28	April 1, 2015 (Wed)	Chapter 6
	L29	April 3, 2015 (Fri)	Chapter 6
Part II: Baby Life Contingencies			
11	L30	April 6, 2015 (Mon)	Chapter 1
	L31	April 8, 2015 (Wed)	Chapter 1
	L32	April 10, 2015 (Fri)	Midterm Exam 2
12	L33	April 13, 2015 (Mon)	Chapter 1
	L34	April 15, 2015 (Wed)	Chapter 1
	L35	April 17, 2015 (Fri)	Chapter 1
13	L36	April 20, 2015 (Mon)	Chapter 1
	L37	April 22, 2015 (Wed)	Chapter 2
	L38	April 24, 2015 (Fri)	Chapter 2
14	L39	April 27, 2015 (Mon)	Chapter 2
	L40	April 29, 2015 (Wed)	Chapter 2
	L41	May 1, 2015 (Fri)	Chapter 2
15	L42	May 4, 2015 (Mon)	Chapter 2
	L43	May 6, 2015 (Wed)	Chapter 2
	L44	May 8, 2015 (Fri)	Chapter 2

6 Grading system

Assessment in this course comprises the following components:

1. Attendance: 0%

You may choose to attend or not to attend classes, but if you choose the latter, then the office hours cannot be used to learn the material covered in class. It is also impossible to get a copy of any course material you miss from the instructor afterwards.

2. Assignments: 10%

There will be 4 to 5 assignments in this course. You will have two weeks to work on each assignment. Late homework will be severely penalized.

A note on collaboration: You are welcome to discuss assignment problems with me during my office hours. You are also encouraged to discuss homework problems with other students. However, what you hand in must ultimately be your own work.

3. Midterm Exams: 40%

There will be two one-hour in-class written Midterm Exams to be held on February 27, 2015 and April 24, 2015. Each exam accounts for 20% of your total grade.

4. Final Examination: 50%

A two-hour comprehensive written examination will take place in the week of May 11-15, 2015. The exact date and time will be announced by the Registrar in mid-February. Do not plan your end-of-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.

All exams in this course are closed-book and no formula sheet is allowed (and on all SOA exams as well!). They consist of short-answer questions similar in style to SOA exam questions. Only SOA/CAS-approved calculators as listed on Point 9 of <https://www.soa.org/Files/Edu/edu-rules-reg-instructions.pdf> are allowed. Exam scores will be uploaded to ICON once they have been available.

Plus or minus grading system will be used in this course. Tentatively, the final grade will be assigned as follows:

Undergraduate students		
A- [85, 90)	A [90, 95)	A+ [95, 100]
B- [70, 75)	B [75, 80)	B+ [80, 85)
C- [55, 60)	C [60, 65)	C+ [65, 70)
D- [40, 45)	D [45, 50)	D+ [50, 55)
F [0, 40)		

Graduate students		
A- [86.5, 91)	A [91, 95.5)	A+ [95.5, 100]
B- [73, 77.5)	B [77.5, 82)	B+ [82, 86.5)
C- [59.5, 64)	C [64, 68.5)	C+ [68.5, 73)
D- [46, 50.5)	D [50.5, 55)	D+ [55, 59.5)
F [0, 46)		

These are not absolute scales and may be slightly adjusted depending on the difficulty of the exams.

Note that a grade of C+ or higher in this course is a prerequisite for ACTS:4180 (22S:181) and ACTS:4380 (22S:183).

College of Liberal Arts & Sciences: Policies and Procedures

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 <http://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 correspondence (Operations Manual, III.15.2. Scroll down to k.11).

Accommodations for Disabilities

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. See www.uiowa.edu/~sds/ for more information.

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 Comprehensive Guide on Sexual Harassment 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.

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