

The University of Iowa
College of Liberal Arts and Sciences
Department of Statistics and Actuarial Science
ACTS:7730 Advanced Topics in Actuarial Science/Financial Mathematics
12:30 – 1:45 PM TTh 248 JH Spring Semester 2024

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Student drop-in hours: 2:30–3:30 p.m. Tuesday, 1:30–2:30 p.m. Wednesday, and 2–3 p.m. Friday, or by appointment

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

Calculus (including differential equations) and probability are used extensively in this course. A main purpose of the course is to study financial theory useful to actuaries working in the life insurance and annuity industry. We shall also discuss portions of the exam syllabi in the Quantitative Finance and Investment (QFI) track and go over some old exam questions.

Exam QFIQF uses two mathematical finance textbooks:

- Hirta & Neftci, *An Introduction to the Mathematics of Financial Derivatives*, Third Edition, Second Printing 2014, Academic Press,
- Chin, Nel, & Olafsson, *Problems & Solutions in Mathematical Finance*, Volume 1, 2014, John Wiley & Sons.

Before we move to the QFI material, we study the following:

Interest Rate Risk Management

Portfolio Theory and Capital Asset Pricing Model

Fundamental Theorem of Asset Pricing

Method of Esscher Transforms

Risk-Neutral (Equivalent Martingale Measure) Pricing

Pricing Compound Options and Multi-Asset Options

Brownian Motion and the Black-Scholes-Merton Equation

Elementary Stochastic Calculus and Ito's Lemma

American Options; Closed-Form Formulas for the Perpetual Case

Barrier Options and Their Use in Modeling Policy Lapses and Surrenders

You can take this course for pass/fail by signing up for zero semester hour.

For those who want a grade: Homework assignments will count for 40% toward the final grade.

For the remaining 60%, you can choose to do a project/presentation or write a final examination.

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]

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