

ACT240 Mathematics of Investment and Credit

Fall 2022

Lecture time: Monday 11am-1pm

Location: Northrop Frye Hall 003

Instructor: Yuchong Zhang

- *Office:* Room 9116, 700 University Avenue
- *Email:* yuchong.zhang@utoronto.ca
- *Office Hour:* Monday 1:30pm-2:30pm

Teaching assistants:

- Sebastian Calcetero (sebastian.calcetero@mail.utoronto.ca)
- Yaqi Shi (yaqi.shi@mail.utoronto.ca)
- Liam Welsh (liam.welsh@mail.utoronto.ca)

TA office hour schedule will be posted on Quercus. There will be a combination of in-person and virtual office hours. All in-person TA office hours will be held in the Office Hour space in Sidney Smith 623B on the ground floor (floor G).

Masks on campus: The use of masks is strongly encouraged in the classroom and during in-person office hours. We ask everyone to respect each other's decisions, comfort levels, and health needs.

Description of this course: Welcome to ACT240, your first actuarial science core course! In this course we will study the theory of interest, including discount and present values, determination of prices of annuities, mortgages, bonds and equities, loan amortization, yield rates on investments, etc. This course is for students working to enter actuarial science major or specialist program, and is designed to help prepare you for exam FM of the Society of Actuaries and for future university courses. For other students interested in similar course material, please enroll in ACT230 Math of Finance for Non-Actuaries.

Course website: Quercus (Course materials provided on Quercus are for the use of students currently enrolled in this course only. Providing course materials to anyone outside of the course is unauthorized use.)

We will run a course forum on Piazza (accessible from Quercus) where you can post questions and comment on other people's posts. Find our class signup link at: <https://piazza.com/utoronto.ca/fall2022/act240h1flec0101>. Public posting mode is strongly encouraged so that other can benefit from your question as well; there is an option to post anonymously if you wish. Your instructor and TA will monitor the forum and try our best to answer any course-related questions in a timely manner. For private or sensitive questions; please email your instructor or TA directly.

Textbook (required):

- ACT240H + ACT245H Coursebook, 2022-23 edition, Broverman.

The coursebook is available for purchase from the Department of Statistical Sciences during September 9-16, 2022. Please see Quercus announcement for details.

References (optional):

- Broverman (2017). Mathematics of Investment and Credit, 7th edition, ACTEX Publications.
- Daniel and Vaaler (2009) Mathematical Interest Theory, 2nd edition, The Mathematical Association of America.
- Kellison (2008). The Theory of Interest, 3rd edition, McGraw-Hill.

You may use an older/newer edition of the reference books.

Calculator: You need a non-programmable calculator, preferably one of the following SOA-approved calculators: battery or solar-powered Texas Instruments BA-35 model calculator, the BA II Plus, the BA II Plus Professional, the TI-30Xa or TI-30X II (IIS solar or IIB battery), or TI-30X MultiView (XS Solar or XB Battery). We will use BA II Plus for class illustrations.

Grading: Your course grade will be determined by the performance on ten short quizzes ($10 \times 1\%$), two term tests ($2 \times 25\%$) and a final exam (40%).

Quizzes: There will be 10 weekly open-book quizzes, starting from the week of September 19 (excluding weeks when there are no lectures). Each quiz opens on Quercus from 5pm on Monday and is available for 72 hours. Once you begin, you have 15 minutes to complete and submit the quiz. You must complete the quiz individually and independently. If you miss a quiz, you will receive a zero for that quiz. **There are NO makeup for quizzes.** At the end of the semester, I will drop your lowest quiz score, and use the remaining 9 scores for grades calculation.

A practice quiz (Quiz 0) will be given in Week 1 which does not count towards your grades, but helps you to get familiar with the Quizzes environment on Quercus.

Exam dates and policy:

- Term tests (in-person): October 7, 2022 and November 18, 2022 at your tutorial location.
If you miss a term test for a valid reason (e.g. sickness), you need to email me **no later than the day immediately after the term test**, and you need to report your absences via the ACORN absence declaration form. Your missed term test weight will be shifted to the final exam. This “shift” may be done after comparing and adjusting the class average of the missed term test and final exam to ensure fairness to all students. You will be informed of that adjustment should it happen. **You can only do this shift once, i.e. not for both term tests.** Please note false claim of sickness or personal emergency is an offence under the Code of Behaviour on Academic Matters.
- Final exam (in-person): TBA. All students must take the final at the time scheduled by the university.

All exams will be closed-book with a time limit, but you are allowed a non-programmable calculator, and a one-side 8.5” \times 5.5” cheat sheet.

Tutorials: Friday 10am-11am. Two of the tutorials will be used for term tests. The remaining tutorials will be TA-led problem sessions. Your TA will also leave time for you to ask questions.

- TUT0101: Sebastian Calcetero. Location: MS4171
- TUT0102: Liam Welsh. Location: SS1087
- TUT0103: Yaqi Shi. Location: HA403

Academic Integrity: The University of Toronto's intellectual community relies on academic integrity and responsibility as the cornerstone of its work. As a student, you alone are responsible for ensuring the integrity of your work and for understanding what constitutes an academic offence. Please visit <http://www.artsci.utoronto.ca/osai/students> for the rules and expectations, and tips on how to avoid committing an academic offence. Failure to observe these rules of conduct will have serious academic consequences, up to and including expulsion from the university.

Tentative coverage:

- Interest rate measurement (Sections 1-3)
- Valuation of annuities (Sections 4-8)
- Loan repayment (Section 9)
- Bond valuation (Sections 10-11)
- Measuring the rate of return on a fund (Section 12)

Canadian Institute of Actuaries University Accreditation Program: This course is one of the mandatory courses under Canadian Institute of Actuaries (CIA)'s University Accreditation Program (UAP). UAP has moved away from the course-by-course accreditation method and towards program accreditation method (the "Pathway 1 of CIA qualification"). Under the new pathway, in order to obtain ACIA (Associate of CIA) professional credential, students need to:

1. Complete a degree from an actuarial program (ACT Specialist or Major) at University of Toronto and pass a list of mandatory courses. No minimum course grade or GPA is required as long as students pass all the mandatory courses. The full list of UofT's 16 mandatory courses are: ACT240, ACT245, ACT247, ACT348, ACT349, ACT370, ACT451, ACT452, ACT466, STA257, STA261, STA302, STA314, ECO101, ECO102, MGT201/RSM219.

For transition: CIA will accept an actuarial degree from UofT completed between June 30, 2015 and October 31, 2023 without all the specified mandatory courses.

2. Complete the ACIA Module (administered by CIA, projected Spring 2023).

For transition: a student can be exempt from the ACIA Module if they complete SOA exam PA and the 8 FAP Modules and assessments by December 31, 2023.

3. Complete an open-book ACIA Capstone Exam (administered by CIA, projected Fall 2023).

For transition: a student can be exempt from the capstone exam by completing any combination of UAP credits or exams for P, FM, IFM, LTAM, STAM and SRM by October 31, 2023. The deadline to apply for UAP credits is September 30, 2023.

Details on the new pathway for students can be found here: <https://education.cia-ica.ca/acia/acia-for-accredited-university-students/>