

**University of Toronto**  
**Department of Statistical Sciences**

**ACT240 – Mathematics of Investment and Credit**

(Summer 2022)

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**Lectures:** Monday & Wednesday, 7 – 9 pm, on MS 4279. **We are mostly meeting in person the whole term; however, we might have some online lectures at <https://utoronto.zoom.us/j/89195159463>.** All the possible updates regarding this course will be made in class or on Quercus.

**Instructor Office Hour:** Monday and Wednesday, at 9 pm (immediately after the lecture), in the same classroom (or in the zoom room if online). I will stay in the room after the lecture until there are no more questions, or at most 1 hour after. I will answer the questions in public, but if you have a private question, please send me an email and we will schedule a virtual appointment.

**Tutorials:** Monday & Wednesday, 6 – 7 pm (right before the lecture), in the same classroom as the lecture. **We are mostly meeting in person the whole term; however, we might have some online tutorials at <https://utoronto.zoom.us/j/89195159463>.** Please note:

(1) The first tutorial is on May 11<sup>th</sup>, and the last tutorial is on June 20<sup>th</sup>.

(2) Attendance to tutorials is not mandatory. TAs may go over some practice questions, and they may leave time for you to ask your questions. So, you can view a part of the tutorials as a semi-group office hour with your TA.

**Piazza:** TAs will be answering questions in Piazza each week. No questions will be answered on weekends, so try to post your questions on weekdays only.

**Course Description:**

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. In addition to learning standard textbook materials, we will also apply them in real-life scenarios, such as payday loans, stock pricing, residential mortgage and pension, etc.

Note: This course is for students working to enter an actuarial science major or specialist program. For other students interested in similar course material, please enroll in ACT230 Mathematics of Finance for Non-Actuaries. In addition, in order to enroll in any 300- or 400-level ACT course, a minimum grade of 63% must be obtained in each of ACT240, ACT245 and ACT247.

## Teaching Style:

I will be following the coursebook very closely. I will present only the key points of the topics in a slide show and do some example problems in the lecture. I will post these slides before the lectures so you can bring them to class and annotate on them if you want to. I will also post my annotated version of the slides after the lecture. I will be assuming that you are also doing your part by reading the coursebook, solving all questions in the problem sets and attending tutorials. This as the time allocated in the lecture is only enough to grasp the content of the course, and a lot of autonomous work must be done. This class also prepares you for the Financial Mathematics (FM) exam of the Society of Actuaries (SOA) and the Casualty Actuarial Society (CAS), so most of the questions and examples will resemble the structure of such exams.

## Textbook:

The main textbook is Broverman coursebook for ACT240+ACT245. We have made that available for online purchase through the UofT bookstore website. Please follow these instructions to directly purchase your coursebook:

Navigate to the Course Materials section on the University of Toronto Bookstore Website at [https://uoftbookstore.com/buy\\_book\\_detail.asp?pf\\_id=15027689](https://uoftbookstore.com/buy_book_detail.asp?pf_id=15027689)

Follow the steps to purchase your copy. Recall that this is a print copy, so you don't need to do any checking out via the eBook Shopping Cart , you have to do it through the regular cart. See the screenshot below.

The screenshot shows the University of Toronto Bookstore website. At the top, there is a search bar labeled 'Search by ISBN or Product Name' and navigation links for 'Hours & Locations' and 'FAQs'. Below the search bar, there are dropdown menus for 'Shop by Category' with options: 'Textbooks & Course Materials', 'Speciality', and 'Services'. On the right side, there are links for 'You are not signed in Sign In' and '1 Item | \$34.95 View Cart'. The main content area is titled 'My Cart' and displays a message: 'Your cart has been updated.' Below this, there is a table with the following columns: 'Price', 'Qty', and 'Total Price'. The table contains one row for 'Act240/Act245 Coursebook' with a price of \$34.95, a quantity of 1, and a total price of \$34.95. The item details include 'NEW', 'SKU: 15027689', 'Author(s): Broverman 2022', and 'Copyright: 22'. Below the table, there is an 'UPDATE TOTALS' button. At the bottom, there is a 'Coupon Code' input field with an 'APPLY' button. The 'Purchase Subtotal' is \$34.95. At the very bottom, there are two buttons: 'SAVE CART FOR LATER' and 'CHECKOUT »'.

	Price	Qty	Total Price
Act240/Act245 Coursebook NEW SKU: 15027689 Author(s): Broverman 2022 Copyright: 22	\$34.95	1	\$34.95

## Calculator:

You need 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).

### Course Evaluation:

You will require a reliable internet connection to complete the weekly quizzes, term tests and final assessment. All quizzes and exams will be held using the Quizzes tool on Quercus.

	Weight	Details
Weekly Quizzes	15%	7 in total on Fridays through the Quizzes function on Quercus. The best 5 quizzes will be used for the final grade.
Exam 1	25%	May 25. You can use a cheat sheet.
Exam 2	25%	June 13. You can use a cheat sheet.
Final assessment	35%	TBA. You can use a cheat sheet.

Each quiz will consist of 2 questions related to the topics covered in the lectures in that same week. The questions will be very similar to examples in the lecture and exercises in the study manual. These are low-stake formative assessments to make sure you are constantly working on the course.

The weekly quiz will become available on Quercus no later than 10am on Fridays, and I will leave the quiz window open until midnight. Once you have started the quiz, you'll have 30 minutes to complete it (each question should take less than 10 minutes, but more time is provided in case you encounter a minor tech failure). At the end of the term, I will keep your best 5 quizzes.

More information about the structure and content of the exams will be provided in class or Quercus later in the term, at least one week before each examination.

### Re-Marking:

Any requests to have your work remarked must contain a detailed written justification. Remarking requests should be emailed to the instructor within one week of receiving your mark, otherwise, they won't be processed. Note that adjustments in marks could equally result in a lowering or raising of the mark. When appealing a re-evaluation decision, the student accepts this condition.

### Missed Quizzes and Tests:

The following rules will be strictly enforced, and no exception will be made.

1. Quizzes: There are no make-up quizzes, and no marks will be given to missed quizzes.
2. Exams:
  - If you miss one exam due to valid reasons, either Exam 1 OR Exam 2, you must notify the instructor **via email by the end of the day immediately after the missed examination**. Also, you must use the Absence Declaration area in ACORN to formally declare the absence to the University. The exam weight will be shifted proportionally to the final assessment and the quizzes associated with the topics of the missed exam.
  - **YOU ARE NOT ALLOWED TO MISS MORE THAN ONE TEST.** Students who miss both term tests will lose automatically 25% of the final mark and the remaining 25% will be shifted proportionally to the final assessment and the quizzes.

**Tentative Schedule** (subject to modification):

Week	Date	Course Content
1	May 9 (Mon)	-Course orientation; Introduction to simple/compound interest. - Readings: Section 1.
	May 11 (Wed)	Nominal rates of interest and discount. - Readings: Section 2.
2	May 16 (Mon)	Force of interest; Inflation; Risk of Default. - Readings: Section 3.
	May 18 (Wed)	Annuity immediate/due; and valuation at any time point. - Readings: Section 4 & 5.
3	May 23 (Mon)	Victoria Day: No class.
	May 25 (Wed)	- Quick review for E1 and last-minute questions in the Tutorial. - <b>Exam 1 (up to Section 4)</b> (25%): during lecture time.
4	May 30 (Mon)	Annuities with different interest and payment periods. - Readings: Section 6.
	June 1 (Wed)	Annuities with arithmetic/geometric payments. - Readings: Section 7 & 8.
5	June 6 (Mon)	Loan amortization. - Readings: Section 9.
	June 8 (Wed)	Bond valuation. - Readings: Section 10.
6	June 13 (Mon)	- Quick review for E2 and last-minute questions in the Tutorial. - <b>Exam 2 (up to Section 9)</b> (25%): during lecture time.
	June 15 (Wed)	Bond amortization. - Readings: Section 11.
7+	June 20 (Mon)	Measurements of the rate of return on a fund. - Readings: Section 12.
	June 22 - 28	<b>Final assessment</b> (35%): Time TBA. Covers everything.

## **Accessibility Services:**

Students with diverse learning styles and needs are welcome in this course. In particular, if you have a disability/health consideration that may require accommodations, please feel free to approach the instructor and/or Accessibility Services at 416-978 8060; [studentlife.utoronto.ca/as](http://studentlife.utoronto.ca/as).

## **Academic Integrity:**

Academic integrity is fundamental to learning and scholarship at the University of Toronto. All work must be done by yourself, without help from others. Receiving help from anyone on an assessment, whether they are another student in the course or someone external to the course, is a serious academic offence. Providing help to another student in the course on an assessment is an equally serious academic offence. Posting or distributing questions from assessments is not permitted at any time.

Please further familiarize yourself with the University of Toronto's Code of Behavior on Academic Matters available at <http://academicintegrity.utoronto.ca>, or you may also look at <https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity>.

## **Lead a Recognized Study Group (RSG) for this course**

Apply now to be an RSG Leader for this course. RSGs are peer-led study groups of up to 8 students enrolled in the same A&S course.

Volunteering to be an RSG Leader is a great way to:

- Make friends in your courses
- Gain new leadership and group-facilitation skills
- Increase your understanding of course material
- Prepare for test and exams
- Boost your resume
- Earn a Co-Curricular Record (CCR) credit

This Fall, over 1,000 students volunteered to be an RSG Leader. Volunteer to be an RSG Leader this term with the support and training of Upper-year Arts & Science students! No experience is necessary.

[Sign up to be an RSG Leader now.](#)

Looking to join an RSG? RSGs for this course will be available to join starting May 16, 2021 on the [Sidney Smith Commons Online](#).

Find more information, visit: <https://uoft.me/recognizedstudygroups> or [@sidneysmithcommons](https://twitter.com/sidneysmithcommons)  
Looking for more ways to study with other students? Join [Meet to Complete](#), daily study-with-me sessions just for Arts & Science students!

## **Canadian Institute of Actuaries (CIA)'s University Accreditation Program (UAP)**

ACT240 is an accredited course under the UAP program. The minimum grade needed to apply for an exemption is 70. For detailed information on UAP, please visit the following webpages:

- University Accreditation Program description (<http://www.cia-ica.ca/membership/uap>)
- List of accredited courses offered by University of Toronto: <http://www.cia-ica.ca/membership/uap/accredited/toronto>
- How to apply for CIA exemptions: <http://www.cia-ica.ca/membership/uap/information-for-students>

Note: The CIA will grant credits to students for SOA/CAS examinations based on the achievement of the minimum Grade towards Associateship (ACIA) and Fellowship (FCIA) in the CIA. At the time of this agreement, CIA credits are recognized by the following actuarial organizations towards their respective designations:

Casualty Actuarial Society (CAS): ACAS, FCAS

UK Institute and Faculty of Actuaries (IFoA): FIA, AIA

Institute of Actuaries of Australia (IAA): AIAA, FIAA

Actuarial Society of South Africa (ASSA): AMASSA, FASSA

American Academy of Actuaries (AAA): MAAA

The CIA does not guarantee that credits granted to students under the CIA UAP will be recognized by any other actuarial organizations towards their actuarial designations.