

**University of Toronto**  
**Department of Statistical Sciences**  
**ACT230H1F**  
**Mathematics of Finance for Non-Actuaries**  
**Fall 2023**

**Course Information**

Instructor Hassan Abdelrahman  
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Lectures Mondays 11:00 – 13:00; Room BA 1130  
Office Hours Thursdays 16:00 – 17:00; Online through Zoom

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Tutorials Fridays 10:00 – 11:00; **Delivery mode TBA**

**Course Description**

Introduction to financial mathematics, interest measurement, present value calculation, annuity valuation, loan amortization, consumer financing arrangements, bond valuation. The course is aimed at a general audience who will not be continuing in the actuarial science program.

**Teaching Style**

My teaching strategy for this course involves closely following the coursebook. During lectures, I will provide slide shows that include only the key points of each topic. However, I will annotate on these slides during the lecture to provide additional context and elaboration. I will upload these slides before the lectures so that you can bring them to class and add your own annotations if you wish (I recommend you to do so). After each lecture, I will also upload my annotated version of the slides. It's important to note that succeeding in this course requires you to read the coursebook, complete the problem sets, and attend tutorials in addition to the lectures. The lectures are intended to help you understand the course material, but you must do independent work as well.

**Required Text**

- ACT230 Revised book 2019, Samuel A Broverman.
- The textbook may be found in a printed form at the U of T bookstore.

**Course Outline**

This course outline is just tentative. Some sections might go faster than others.

| Date    | Schedule             | Topic  | Quizzes |
|---------|----------------------|--|---------|
| Sep 11  | Lecture 1            | Section 1 – Effective Rates of Interest & Discount                     |         |
| Sep 18  | Lecture 2            | Section 2 – Nominal Rates of Interest & Discount                       |         |
| Sep 22  | Tutorial 1           |  |         |
| Sep 25  | Lecture 3            | Section 3 – Force of Interest, Inflation, Risk of Default              | Quiz 1  |
| Sep 29  | Tutorial 2           |  |         |
| Oct 2   | Lecture 4            | Section 4 – Annuity-Immediate & Annuity-Due                            |         |
| Oct 6   | Tutorial 3           |  |         |
| Oct 9   | Thanksgiving Holiday |  |         |
| Oct 13  | Midterm 1            |  |         |
| Oct 16  | Lecture 5            | Section 5 – Annuity Valuation At Any Time Point                        | Quiz 2  |
| Oct 20  | Tutorial 4           |  |         |
| Oct 23  | Lecture 6            | Section 6 – Annuities With Differing Interest and Payment Periods      |         |
| Oct 27  | Tutorial 5           |  |         |
| Oct 30  | Lecture 7            | Sections 7 – Annuities Whose Payments Follow a Geometric Progression   | Quiz 3  |
| Nov 3   | Tutorial 6           |  |         |
| Nov 6*  | Reading Week         |  |         |
| Nov 13  | Lecture 8            | Sections 8 – Annuities Whose Payments Follow an Arithmetic Progression |         |
| Nov 17  | Tutorial 7           |  |         |
| Nov 20  | Lecture 9            | Section 9 – Amortization of a Loan                                     | Quiz 4  |
| Nov 24  | Midterm 2            |  |         |
| Nov 27  | Lecture 10           | Section 10 – Bond Valuation  |         |
| Dec 1   | Tutorial 8           |  |         |
| Dec 4   | Lecture 11           | Section 11 – Bond Amortization, Callable Bonds                         | Quiz 5  |
| Dec 7** | Lecture 12           | Section 12 - Measures of the Rate of Return on a Fund                  |         |

\* Note that November 6 is the last day to drop the course.

\*\* We will have our last class on Thursday, December 7 to substitute for the Thanksgiving holiday. The time and location of the class are TBA.

### Course Assessments

There will be five online quizzes (30 minutes each), two **in-tutorial** midterm tests (55 minutes each) and one final exam (2 hours). The dates and the weights of the assessments are given below:

| Assessment | Date of Evaluation | Weighting |
|------------|--------------------|-----------|
| Quizzes    | Mondays*           | 15%       |
| Midterm 1  | Oct 13             | 25%       |
| Midterm 2  | Nov 24             | 25%       |
| Final      | TBA                | 35%       |
| Total      |                    | 100%      |

**\* Dates: Sep 25, Oct 16, Oct 30, Nov 20 and Dec 4.**

Every two weeks, a quiz will be posted on Quercus no later than 9 am on Mondays, and the quiz window will remain open until midnight. Each quiz will cover the content taught in the previous two weeks. Once you start the quiz, you'll have 30 minutes to finish it.

The structure and content of the exams will be announced at least one week in advance of each exam.

### **Missed Quizzes or Tests**

There are NO make-up quizzes, and so, no marks will be given to missed quizzes. If the midterm is missed for a valid reason, you must provide appropriate documentation, such as the University of Toronto Medical Certificate, University of Toronto Health Services Form, or College Registrar's Letter. You must submit this documentation within one week of the test. If documentation is not received in time, your test mark will be zero. If midterm is missed for a valid reason, the weight of that midterm (or those midterms) will be shifted to the final. For example, if you take the first midterm and miss the second midterm for a valid reason, then your evaluation will be based on the formula  $15\% \times \text{quizzes} + 25\% \times \text{midterm 1} + 60\% \times \text{Final}$ .

**You are not allowed to miss the two midterm tests. Missing both tests would result in an automatic deduction of 25%.**

### **Accessibility Needs**

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 me and/or Accessibility Services at 416-978 8060; [studentlife.utoronto.ca/as](http://studentlife.utoronto.ca/as).

### **Academic Integrity**

At the University of Toronto, academic integrity is a vital part of the learning and academic experience. All assessments and coursework must be completed solely by the individual student, without any outside help. Receiving any form of assistance on an assessment, whether from a fellow student in the course or someone not affiliated with the course, is a severe academic offense. Additionally, providing help to another student in the course on an assessment is equally serious. Posting or sharing questions from assessments is strictly prohibited at all times.

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>.