

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

**ACT240 – Mathematics of Investment and Credit**

(Summer 2020)

**Instructor:** Spark Tseung ([spark.tseung@mail.utoronto.ca](mailto:spark.tseung@mail.utoronto.ca))

**Lectures:** Monday & Wednesday, delivered online

**Teaching Assistant:** Colin Chen ([colin.chen@mail.utoronto.ca](mailto:colin.chen@mail.utoronto.ca))

**Office Hours:** Monday & Wednesday, 19:40-20:50

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

**Textbook:**

The main textbook is Broverman course book for ACT240+ACT245. Additional learning topics will also be presented in lectures.

**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:

	Weight	Details
Weekly Quiz	4%	0.5% for each quiz after Monday/Wednesday lectures. The lowest score out of nine quizzes will be dropped.
Homework	11%	Three in total, weighted 3%, 4% and 4%.
Test 1	22%	May 20.
Test 2	23%	June 3.
Test 3	40%	TBA

### Missed Quizzes, Homework and Tests:

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

- Quizzes: No marks will be given to missed quizzes, and there will be no make-up quizzes.
- Homework: 50% of the assignment marks will be deducted for late submissions within six (6) hours past the deadline. Afterwards, no marks will be given.
- Tests:
  - If you miss Test 1 OR Test 2 due to valid reasons, you must notify the instructor **via email by the day end immediately after the missed term test**. The test weight will be shifted to Test 3 (which becomes 62% if you miss Test 1, or 63% if you miss Test 2).
  - If you miss Test 1 AND Test 2 (both with valid reasons), **an oral, live make-up test** (weighted 23%) will be offered during the week after Test 2, and Tests 3 will be weighted 62%. **No make-up will be offered for the make-up test**, and a zero mark will be given for the missed make-up test.

### Online Format:

In summer 2020, this course is offered fully online. Hence, the following special arrangements are made:

- Time Zone Issues: All course schedules are based on Toronto local time (GMT -5). If you live in a **significantly different time zone**, you should notify the instructor by email **on or before May 5 (Toronto Time)** for special arrangements of all quizzes and tests. In this course, a significantly different time zone is defined to be: starting west from Iceland (GMT +0), going east all the way to central Russia and parts of Southeast Asia (GMT +7).
- Technical Failures: If you encounter any technical failures (power outage, internet failure, etc.) during or right before any online assessments, you should notify the instructor by email at the earliest possible time with details of the incident.
- Make-Up Assessments: Knowingly abusing any of the mechanisms and rules mentioned above will be considered a breach of academic integrity and is subject to disciplinary

actions. The instructor reserves the right to make a reasonably **more difficult make-up test** at his discretion.

**Academic Integrity/Distribution of Course Material:**

To learn about academic integrity, please visit: <https://www.artsci.utoronto.ca/current/academic-advising-and-support/student-academic-integrity>. Distribution of course material (notes, recording, homework, tests, etc.) in any form outside of this class is **strictly prohibited**.

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

Week	Date	Course Content/ <b>Assessment</b>
1	May 4 (Mon)	- Course orientation; Review of calculus; Introduction to simple/compound interest. - <b>Practice quiz</b> (0%): Multiple attempts allowed.
	May 6 (Wed)	- Rate of discount; Nominal rate of interest/discount. - <b>Quiz</b> (0.5%): 20:45-21:00
2	May 11 (Mon)	- Force of interest; Inflation; Risk of Default. - <b>Quiz</b> (0.5%): 20:45-21:00
	May 13 (Wed)	- Annuity immediate/due; Perpetuity. - <b>Quiz</b> (0.5%): 20:45-21:00
3	May 18 (Mon)	- Victoria Day: No class. - <b>Homework 1</b> (3%): Due at 1pm. Submit on Quercus.
	May 20 (Wed)	- Annuity valuation. - <b>Test 1</b> (22%): 20:00-21:00.
4	May 25 (Mon)	- Annuities different interest and payment periods. - <b>Quiz</b> (0.5%): 20:45-21:00
	May 27 (Wed)	- Annuities with arithmetic/geometric payments. - <b>Quiz</b> (0.5%): 20:45-21:00
5	June 1 (Mon)	- Loan amortization. - <b>Quiz</b> (0.5%): 20:45-21:00 - <b>Homework 2</b> (4%): Due at 1pm. Submit on Quercus.
	June 3 (Wed)	- Bond valuation. - <b>Test 2</b> (23%): 20:00-21:00.
6	June 8 (Mon)	- Bond amortization. - <b>Quiz</b> (0.5%): 20:45-21:00
	June 10 (Wed)	- Measurements of the rate of return on a fund. - <b>Quiz</b> (0.5%): 20:45-21:00
7+	June 15 (Mon)	- Further topics; Final Review; Course wrap-up. - <b>Quiz</b> (0.5%): During lecture. - <b>Homework 3</b> (4%): Due at 1pm. Submit on Quercus.
	June 17-25	- <b>Test 3</b> (40%): Time TBA. Covers everything.

## **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.