ACT100H Wizard Managers of Risks: Exploring Actuarial Science
Fall 2025

Course Description:
Are you curious about how mathematics and statistics apply to real-world financial problems? Do you get the full story after watching movies like The Big Short? Do you wonder how insurance companies determine the price of policies or what strategies they use to manage risk? Are you looking for a career path that combines analytical skills with financial acumen? If you find yourself pondering those questions, this is the course for you. We will provide a foundational understanding of the actuarial profession, which plays a crucial role in the financial landscape by evaluating and managing risks.

Instructor:
Professor V. Zhang
Email: vickijing.zhang@utoronto.ca
Office: Room 9132, 700 University Avenue 9th floor

Lecture:
Thursdays 3-5pm
Location: VC (Victoria College, 73 Queen's Park Cres E) Room 323
Course website (Quercus): http://q.utoronto.ca

Office hour:
Tuesdays, 3-4pm at my office
I will also linger after 5pm on Thursdays (i.e. our lecture) to answer questions

Teaching Assistant (TA):
Isaac Kim (iy.kim@mail.utoronto.ca)

Textbook:
There is no textbook for this course. Students are expected to focus on lecture notes. Any additional readings will be posted on Quercus.

Marking Scheme:
1- "In-class portfolio" (20%):
(1) In-class Q&A through Poll Everywhere
(2) In-class small team-based challenges
(3) General attendance and participation in class discussions
- Active and informed participation in various class activities and discussions
- Sometimes this takes the form of an after-seminar homework with a short turnaround
- You will need PollEverywhere for real-time polling questions in class
- You are not mandated to participate in every activity, but the more you participate the better your "portfolio" will be.

2- Four Quercus (online) quizzes (60% in total)
You will be given a minimum 36-hour window to complete each online quiz. Once you have

started the quiz, you only have a set amount of time to complete it. Quiz questions will be very similar to what were discussed in class. The sole purpose of the quizzes is to ensure that you have consistently reviewed the lecture notes so that you will not fall behind in this course.

3- Small-team-based insurance project + short presentation (15%)
Students in small teams will be able to either design their own insurance scheme, or complete a set of tasks in a provided case study. More detailed requirements will be provided on Quercus.

4- Participate in at least two actuarial science-related events and activities outside the classroom (a list of eligible events will be provided on Quercus) (5%).

Calculator:
You will need a financial calculator for this course. It is available for purchase at UofT bookstore.

Estimated Weekly Schedule of Topics:

Seminar 1 September 4 – Introduction:
- An overview of the actuarial profession, key areas of practice
- UofT's actuarial science programs and courses
- Professional credentialing process
- Q&A and student peer networking

Seminar 2 September 11 – Financial Math (Part 1):
- The power of compound interest
- The case of payday loan

Seminar 3 September 18 – Financial Math (Part 2):
- Case study: Mortgages
- Case study: Bonds

Quercus Quiz 1 will become available on September 23 (Tuesday) on Lecture 1-3 material.

Seminar 4 September 25 – Life Insurance:
- Types of life insurance
- Pricing basics of life insurance
- Reserving basics
- Profitability test

Seminar 5 October 2 – Life Annuities:
- Pricing basics of life annuities
- Case study: Simple evaluation of pension liabilities

Quercus Quiz 2 will become available on October 7 (Tuesday) on Lecture 4-5 material.

Seminar 6 October 9 – Corporate Finance for Actuarial Science:

- What does classic theory tell us about corporation leverage? When does the classic theory fail to work?
- Shareholder strategies, agency cost of debt vs. equity

Seminar 7 October 16 – Frequency and Severity Loss Models (Part 1):
- Basics of probability distributions
- Case study: fitting a model to claims data, estimate parameters, visualize results

Seminar 8 October 23 – Loss Models (Part 2):
- Credibility model
- Other applications of loss models

Quercus Quiz 3 will become available on October 28 (Tuesday) on Lecture 6-8 material.

October 30 – Reading week, no lecture

Seminar 9 November 6 – Insurance vs. Derivatives:
- Basics of financial derivatives
- Hedging vs. speculation

Seminar 10 November 13 – Derivatives and Other Common Risk Management Techniques
- What did "Big Short" teach us?
- More on financial derivatives, moral hazard
- Other common risk management techniques (Diversification, Reinsurance, Derivative hedging, Insurance-linked securitization)

Quercus Quiz 4 will become available on November 18 (Tuesday) on Lecture 9-10 material.

Seminar 11 November 20 – Topics in Modern Property & Casualty (P&C) Insurance
- Industry experts will deliver a guest lecture on case studies and new trends in P&C insurance
- Attendance is mandatory

Seminar 12 November 27 – Student final presentations on insurance projects

Missed Assignments or Quizzes
- There is no make-up for course assignments or in-class activities.
- However, there may be several bonus points activities throughout the course to help students who occasionally miss the seminar.

Academic Integrity
Academic integrity is fundamental to learning and scholarship at the University of Toronto. All assessments in this course are "open-book" in nature (i.e. you can consult your lecture notes). However, unless specified otherwise (e.g. team challenges in class), 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 Behaviour on Academic Matters available at http://academicintegrity.utoronto.ca.