

The University of Western Ontario – Department of Statistical and Actuarial Sciences
ACTUARIAL SCIENCE 2053

Mathematics for Financial Analysis -- 2025-26

Instructor	Sec	Day/Time	Location	email	Office/Phone
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1. Pre-requisites

Grade 12U calculus (or equivalent), PLUS one full university level course (or 2 half courses) from Mathematics, Applied Mathematics, Calculus, or Linear Algebra

Anti-requisites:

Actuarial Science 2553A

Students are advised that they are responsible to ensure that they possess the necessary prerequisites (or have written special permission) and that de-registration may occur at any time if they lack the prerequisite or have taken an anti-requisite course.

2. Textbooks (both are available in the UWO bookstore and both are REQUIRED)

- “Mathematics of Finance”, 9th Edition, by Brown-Kopp
(softcover: \$129.95; e-book only: \$99.00)
- Study note package (which contains chapters 8 to 12) (\$38.00)

3. Course Outline (course is divided into 3 semesters):

Text	Chapter	Topic
1. Textbook	1	Simple Interest and Simple Discount
	2	Compound Interest (skip section 2.10)
	3	Simple Annuities
	4	General and Other Annuities
2. Textbook	5	Repayment of Debts
	6	Bonds (skip Serial Bonds of section 6.7)
	7	Business Decisions, Capital Budgeting, Depreciation
Study Note	8	Fixed Income Investments
3. Study Note	9	Probability and Life Tables
	10	Life Annuities
	11	Life Insurance
	12	Life Insurance Expenses

4. Midterm Exam 1

Monday, November 10, 2025 – 6 pm to 9 pm; Chapters 1, 2, 3, 4

The format will be either multiple-choice or written answer, or a combination of the two (to be announced later). A formula page will be provided. It will be CLOSED BOOK.

5. Midterm Exam 2

Friday, February 6, 2025 – 6 pm to 9 pm; Chapters 5, 6, 7, 8

The format will be either multiple-choice or written answer, or a combination of the two (to be announced later). A formula page will be provided. It will be CLOSED BOOK.

NOTE: If you miss either midterm exam, you will be required to write the make up exam. The dates of the make up exams have not yet been set, but will likely be in the evening of the following Thursday (more detail about missing an exam is given in section 12, on page 5).

6. Final Exam

Scheduled for the final exam period – 3 hours

Chapters 9, 10, 11, 12

The format will be either multiple-choice or written answer, or a combination of the two (to be announced later). A formula page will be provided. It will be CLOSED BOOK.

You will also need a pocket calculator (non-programmable) for the tests and the exams.

Note: There will not be a December exam.

7. In-class Quizzes

There will be 8 (4 per term) short written answer question quizzes that will be given at the very start of class on the following **Wednesdays**:

1	September 24, 2025		5	January 28, 2026
2	October 8, 2025		6	March 4, 2026
3	October 29, 2025		7	March 18, 2026
4	December 3, 2025		8	April 1, 2026

- The quizzes will start right at the beginning of the class on the above dates and you will have 16 minutes to complete the assigned question(s) – **do NOT be late for class on these dates as you will NOT be given extra time (PLUS: if you arrive more than 5 minutes after the quiz has started, you will NOT be allowed to write the quiz)**
- The quizzes will consist of 2 questions (or perhaps 1 question with multiple parts) that will be based on material covered over the past 2-3 weeks of classes
- The quizzes will be out of 8 marks – you will get 2 marks just for signing your name and handing in a blank answer (note: this is NOT a bonus of 2 marks that everyone gets; it just means the minimum anyone can get on a quiz that they show up for is 2 out of 8)
- Only the best 6 out of the 8 quizzes will count towards your final mark
- **If you miss a quiz due to a health reason, that missed quiz will be one of the two that will not count towards your final mark** (there are NO make up quizzes)

Cellular phones, iPods, and other similar technology are *not* permitted in the exam room. This means that cellular phones, iPods, and other similar technology **cannot** be used as a timekeeper/clock, calculator, or for any other purpose

NOTE

- **Fall reading week:** November 3 to 7, 2025 (no classes)
- **Winter reading week:** February 16 to 20, 2026 (no classes)
- I will be away on Friday, October 17, 2025; there will be no in-person class; instead I will be posting a video of the lecture we would have had;

8. Evaluation

	Original	If you do poorly on one exam		
Quizzes (best 6 of 8)	15%	15%	15%	15%
Midterm 1	28 1/3%	21%	32%	32%
Midterm 2	28 1/3%	32%	21%	32%
Final Exam	28 1/3%	32%	32%	21%

The marking scheme that gives the higher final mark will be the one used for that student.

9. Course OWL Brightscope Web Page

The web page will contain:

1. A copy of this course outline
2. Copies of tests and exams from the previous year (with solutions)
3. Solutions to the exercises in the 9th edition of the textbook (as pdf files)
4. Weekly updates and information about the course that you need to know
5. **Daily class notes (which will be incomplete – to be filled in during the classes).**
6. Marks of quizzes and tests as they are marked.

10. Course Objectives

This course is not intended to make you financial geniuses or to suggest what investments or insurance products you should be buying.

Instead, the objective of this course is to show you how you can do many useful financial calculations yourself, using a calculator, pen and paper (the textbook also shows you how some of the calculations can be done using a computer spreadsheet, although we will not be doing this in class). Some of the calculations you will be able to do by the end of the course include:

1. Accumulating & discounting a single sum of money using either simple or compound interest
2. Accumulating & discounting a series of payments made at equal time intervals using compound interest
3. Calculating loan payments, including mortgage payments
4. Determining the rate of return on an investment
5. Determining the price of a bond or the rate of return on a bond
6. Understanding the yield curve and the risks involved with a fixed income investment

In the last part of the course you will be introduced to the fundamentals of financial calculations involving life contingencies. You will be able to:

1. Perform calculations involving probabilities of living or dying within a certain period of time
2. Calculate how much money you need at a certain age to purchase an annuity paying you a certain amount of money every year or every month for the rest of your life
3. Calculate the premium to be paid for a certain type of life insurance policy

Your ability to do all the above (and more) will be evaluated through written answer questions on the in-class quizzes and through a multiple choice questions on three exams.

11. APPROXIMATE Weekly Course Outline:

Week – 2025	Section	
Sept 8-12	Accumulating/discounting simple interest (section 1.1-1.2)	
Sept 15-19	Equations of value, partial payments, simple discount (section 1.3 to 1.5)	
Sept 22-26	Accumulating/discounting with compound interest, equivalent rates, fractional periods (section 2.1-2.4)	
In-class Quiz #1 – Wed, September 24 at start of class		
Sept 29, Oct 1-3	Determining the time and interest rate, equations of value, changing rates, other applications (section 2.5 to 2.8)	
Oct 6-10	Ordinary annuities – accumulated value (section 3.1, 3.2)	
In-class Quiz #2 – Wed, October 8 at start of class		
Oct 13-17	Ordinary annuities – present value + other annuities (section 3.3, 3.4)	
Oct 20-24	Other annuities (section 3.4); Determining term/rate (sections 3.5, 3.6)	
Oct 27-31	General annuities, mortgages, Perpetuities, (section 4.1-4.2-4.3)	
In-class Quiz #3 – FRIDAY, October 29		
FALL READING WEEK		
MIDTERM EXAM #1 – MONDAY, November 10 – 6:00 to 9:00 pm		
Nov 10-14	Varying annuities (section 4.4), Amortization (section 5.1)	
Nov 17-21	Outstanding balance, Refinancing, Sum of digits (section 5.2, 5.3, 5.4)	
Nov 24-28	Sinking Funds (5.5/5.6/5.7) Bonds–Purchase price (6.1/6.2)	
In-class Quiz #4 – Wed, December 3 at start of class		
Dec 1-5, 8	Premium and Discount, Callable Bonds, Bonds bought between dates (section 6.3, 6.4, 6.5)	
NO DECEMBER EXAM		
Week – 2026		
Jan 5-9	Rate of return on a bond, other types of bonds (section 6.6, 6.7); Net present value, Internal rate of return, (section 7.1, 7.2)	
Jan 12-16	Dollar weighted and time weighted rates of return (section 7.3, 7.4) Capitalized Costs, Depreciation (section 7.5, 7.6);	
Jan 19-23	Fixed income investments, yield curve, forward interest rates (8.1, 8.2), Types of Risk (8.3)	
Jan 26-30	Duration, convexity (sections 8.4 to 8.7)	
In-class Quiz #5 – Wed, January 28 at start of class		
Feb 2-6	Probability, life tables probabilities (section 9.1 to 9.5)	
MIDTERM EXAM #2 – Friday, February 6 – 6:00 pm to 9:00 pm		
Feb 9-13	Expectation of life, select mortality (section 9.6, 9.7)	
Feb 16-20	WINTER READING WEEK	
Feb 23-27	Life annuities, pure endowments (section 10.1, 10.2, 10.3)	
Mar 2-6	Whole life, temporary and deferred life annuities, (section 10.4-10.6)	
In-class Quiz #6 – Wed, March 4 at start of class		
Mar 9-13	Varying annuities, life annuities payable more than once a year, whole life insurance (section 10.7, 10.8, 11.1)	
Mar 16-20	Whole life insurance (section 11.2, 11.3), Net Annual Premiums (11.4)	
In-class Quiz #7 – Wed, March 18 at start of class		
Mar 23-27, 30	Term, endowment, deferred, varying insurance (sect 11.5 to 11.8)	
Apr 1-3, 6, 8	Expenses; Types of life insurance expenses (section 12.1, 12.2)	
In-class Quiz #8 – Wed, April 1 at start of class		
FINAL EXAM – To be scheduled in final exam period		

12. General information about missed coursework

If a student misses a major exam (midterm 1, midterm 2 or final exam), they need to provide documentation as to why they missed the exam and submit it to academic counselling in their faculty for approval. The Student Medical Certificate is available at

http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

Note that in all cases, students are required to contact their instructors within 24 hours of the end of the period covered.

Students should also note that individual instructors are **not** permitted to receive documentation directly from a student, whether in support of an application for consideration on medical grounds, or for other reasons.

This year students are allowed to submit what is referred to as an Academic Consideration Request Without Supporting Documentation” (ACRWSD), which allows the student to miss one piece of coursework per semester (but not for the final exam) for any reason, without having to submit any documentation.

However, course instructors are allowed to designate one exam per semester where a student cannot use an ACRWSD. To this end, it has been decided to allow students to use an ACRWSD for one of the two midterms in this course, but not for both.

Keep in mind that it is NOT a requirement for students to use any ACRWSD’s. It is advisable for students to write the exams on the date and time they are scheduled unless you really are sick and unable to write.

With this in mind, here is information about what to do if you miss any of the required work in this course:

a) Final Exam

- Students cannot use an ACRWSD
- If the exam is missed for a valid reason, the student must provide documentation to academic counselling in their faculty.
- If approved, the student will write the make up exam (which is usually held during the second Thursday in May)

b) Midterm 1

- Students may use an ACRWSD
- OR they can provide documentation to academic counselling
- Those using an ACRWSD, or those with academic counselling approval, will write the make up exam, normally held on the Thursday following the date of the exam (the weight of midterm 1 will NOT be transferred to other parts of the grading scheme)

c) Midterm 2

- Students may use an ACRWSD, but ONLY if they have not used an ACRWSD for midterm 1
- Otherwise they must provide documentation to academic counselling
- Those using an ACRWSD, or those with academic counselling approval, will write the make up exam, normally held on the Thursday following the date of the exam (the weight of midterm 2 will NOT be transferred to other parts of the grading scheme)

d) In-class Quizzes

- Since the quizzes are set up so that only the best 6 of 8 count towards your final mark, using an ACRWSD for any missed quizzes **will not be allowed, nor will any medical reason be allowed for missing a third quiz**
- If more than two quizzes are missed, they will count as a mark of ZERO (and count as one of the “best 6 out of 8” quizzes)

Students must familiarize themselves with the *University Policy on Academic Consideration – Undergraduate Students in First Entry Programs* posted on the Academic Calendar: https://www.uwo.ca/univsec/pdf/academic_policies/appeals/academic_consideration_Sep24.pdf,

This policy does not apply to requests for Academic Consideration submitted for **attempted or completed work**, whether online or in person. That is, the above information is only good for course work that was MISSED.

For procedures on how to submit Academic Consideration requests, please see the information posted on the Office of the Registrar’s webpage:

https://registrar.uwo.ca/academics/academic_considerations/

All requests for Academic Consideration must be made within 48 hours after the assessment date or submission deadline.

When a student *mistakenly* submits their one allowed **Academic Consideration Request Without supporting documentation (an ACRWSD)** for the assessments listed above, the request cannot be recalled and reapplied. This privilege is forfeited.

13. Additional Statements

Rounding of marks

Across the Sciences Undergraduate Education programs, we strive to maintain high standards that reflect the effort that both students and faculty put into the teaching and learning experience during this course. All students will be treated equally and evaluated based only on their actual achievement. *Final grades* on this course, irrespective of the number of decimal places used in marking individual assignments and tests, will be calculated to one decimal place and rounded to the nearest integer, e.g., 74.4 becomes 74, and 74.5 becomes 75. Marks WILL NOT be bumped to the next grade or GPA, e.g. a 79 will NOT be bumped up to an 80, an 84 WILL NOT be bumped up to an 85, etc. The mark attained is the mark you achieved, and the mark assigned; requests for mark “bumping” will be denied.

Absences from Final Examinations

If you miss the Final Exam, please contact the Academic Counselling office of your Faculty of Registration as soon as you are able to do so. They will assess your eligibility to write the Special Examination (the name given by the University to a makeup Final Exam).

You may also be eligible to write the Special Exam if you are in a “Multiple Exam Situation” (e.g., more than 2 exams in 23-hour period, more than 3 exams in a 47-hour period).

If a student fails to write a scheduled Special Examination, the date of the next Special Examination (if granted) normally will be the scheduled date for the final exam the next time this course is offered. The maximum course load for that term will be reduced by the credit of the course(s) for which the final examination has been deferred. See the Academic Calendar for details (under Special Examinations).

Religious Accommodation

When conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request an accommodation for their absence in writing to the course instructor and/or the Academic Advising office of their Faculty of Registration. This notice should be made as early as possible but not later than two weeks prior to the writing or the examination (or one week prior to the writing of the test).

Please visit the Diversity Calendars posted on our university’s EDID website for the recognized religious holidays:

<https://www.edi.uwo.ca>.

Accommodation Policies

Students with disabilities are encouraged to contact Accessible Education, which provides recommendations for accommodation based on medical documentation or psychological and cognitive testing. The policy on Academic Accommodation for Students with Disabilities can be found at:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Accommodation_disabilities.pdf.

Academic Policies

The website for Registrar Services is <https://www.registrar.uwo.ca/>.

In accordance with policy,

https://www.uwo.ca/univsec/pdf/policies_procedures/section1/mapp113.pdf,

the centrally administered e-mail account provided to students will be considered the individual's official university e-mail address. It is the responsibility of the account holder to ensure that e-mail received from the University at their official university address is attended to in a timely manner.

Scholastic offences are taken seriously and students are directed to read the appropriate policy, specifically, the definition of what constitutes a Scholastic Offence, at the following Web site:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/scholastic_discipline_undergrad.pdf.

Support Services

Please visit the Science & Basic Medical Sciences Academic Advising webpage for information on adding/dropping courses, academic considerations for absences, appeals, exam conflicts, and many other academic-related matters: <https://www.uwo.ca/sci/counselling/>.

Students who are in emotional/mental distress should refer to Mental Health@Western (<https://uwo.ca/health/>) for a complete list of options about how to obtain help.

Western is committed to reducing incidents of gender-based and sexual violence and providing compassionate support to anyone who has gone through these traumatic events. If you have experienced sexual or gender-based violence (either recently or in the past), you will find information about support services for survivors, including emergency contacts at

https://www.uwo.ca/health/student_support/survivor_support/get-help.html.

To connect with a case manager or set up an appointment, please contact support@uwo.ca.

Please contact the course instructor if you require lecture or printed material in an alternate format or if any other arrangements can make this course more accessible to you. You may also wish to contact Accessible Education at

http://academicsupport.uwo.ca/accessible_education/index.html

if you have any questions regarding accommodations.

Learning-skills counsellors at Learning Development and Success (<https://learning.uwo.ca>) are ready to help you improve your learning skills. They offer presentations on strategies for improving time management, multiple-choice exam preparation/writing, textbook reading, and more. Individual support is offered throughout the Fall/Winter terms in the drop-in Learning Help Centre, and year-round through individual counselling.

Additional student-run support services are offered by the USC, <https://westernusc.ca/services/>.