

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

Mathematics for Financial Analysis -- 2019-20

Instructor	Sec	Day/Time	Location	email	Office/Phone
Mr. Steve Kopp	001	MWF – 11:30- 12:20	NCB 113	kopp@stats.uwo.ca	WSC 284/x86288
Mr. Amin Hassan Zadeh (1 st)	002	Tu – 9:30-11:20	NCB 113	ahassan@stats.uwo.ca	WSC 223
Mr Joe Raaymakers (2 nd)		Th – 10:30-11:20		jraaymakers@stats.uwo.ca	WSC 107
Ms. Mary Millard (Kings College)	570	M – 10:00-11:30 W – 10:00-11:30	LH 100	millard@uwo.ca	
Ms. Mary Millard (Kings College)	571	M – 2:30-4:00 W – 2:30-4:00	LH 100		

Prerequisites:

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.

Textbooks (both are available in the UWO bookstore)

- “Mathematics of Finance”, 8th Edition, by Brown-Kopp (\$91.75)
- Study note package (\$29.47)

Course Outline (course is divided into 2 terms):

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

Term Tests

1. Test 1: **Friday, October 25, 2019 -- 6 to 8 pm** – topics to be posted on OWL
2. Test 2: **Friday, February 28, 2020 -- 6 to 8 pm** – topics to be posted on OWL

The format will most likely be multiple-choice questions. A formula page will be provided for both tests.

NOTE: There is NO makeup test to either Test 1 or Test 2. If you miss either test (with a valid reason), the 18% weight will be moved to the mid term exam (if you miss Test 1) or the final exam (if you miss Test 2). You should think twice before deciding to miss a test.

Mid Term Exam

To be scheduled during the December Exam period

Chapters 1, 2, 3, 4, 5, and part of chapter 6

- The midterm exam will cover all material from the first term, including material that was tested on Test 1. It will be a 3-hour exam that may either be multiple choice questions OR a combination of multiple choice and short written answer questions. A formula page will be provided.

Final Exam

Scheduled for the final exam period.

Rest of Chapter 6, all of chapters 7, 8, 9, 10, 11, 12

- The final exam will be a 3-hour exam that may either be multiple choice questions OR a combination of multiple choice and short written answer questions. A formula page will be provided. It will be based on material covered in class only since the midterm exam but will include material from the 2nd term test.

You will also need a pocket calculator for the tests and the exams.

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 (section 001) OR Tuesdays (section 002)**:

1	September 25, 2019 (001) September 24, 2019 (002)	5	January 22, 2020 (001) January 21, 2020 (002)
2	October 16, 2019 (001) October 15, 2019 (002)	6	February 5, 2020 (001) February 4, 2020 (002)
3	November 13, 2019 (001) November 12, 2019 (002)	7	March 11, 2020 (001) March 10, 2020 (002)
4	November 27, 2019 (001) November 26, 2019 (002)	8	March 25, 2020 (001) March 24, 2020 (002)

- The quizzes will start right at the start of the class on the above dates and you will have 15 minutes to complete the assigned question(s) – **do NOT be late for class on these dates as you will NOT be given extra time**
- 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
- You will show ALL your work in solving the question (as part marks will be available)
- The quizzes will be out of 8 marks – you will get 2 out of 8 just for signing your name and handing in a blank answer
- Only your best 6 out of 8 quizzes will count in your final mark (so you can miss up to 2 quizzes for any reason and you do not need any medical documentation).

Evaluation

	Original	If you do poorly on one test	
Quizzes (best 6 out of 8)	10%	10%	10%
Test 1	18%	9%	18%
Mid Term	27%	36%	27%
Test 2	18%	18%	9%
Final Exam	27%	27%	36%

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

Course OWL 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 8th 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)** and other things that are relevant to the course.
6. Marks of quizzes and tests as they are marked.

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, either using a calculator, pen and paper OR using a computer spreadsheet. 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. Depreciating physical assets
5. Determining the rate of return on an investment
6. Determining the price of a bond or the rate of return on a bond
7. 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 combination multiple choice/written answer questions on two tests and two exams.

APPROXIMATE Weekly Course Outline:

Week – 2019	Section	
Sept 5-13	Accumulating/discounting simple interest (sect 1.1-1.2)	
Sept 16-20	Equations of value, partial payments, simple discount (section 1.3 to 1.5)	
Sept 23-27	Accumulating/discounting with compound interest, equivalent rates, fractional periods (section 2.1-2.4)	
In-class Quiz #1 – Tues/Wed, September 24/25 at start of class		
Sep 30-Oct 4	Determining the time and interest rate, equations of value, changing rates, other applications (section 2.5 to 2.10)	
Oct 7-11	Ordinary annuities – accumulated value (section 3.1, 3.2)	
Oct 15-18	Ordinary annuities – present value + other annuities (section 3.3, 3.4)	
In-class Quiz #2 – Tues/Wed, October 15/16 at start of class		
Oct 21-25	Other annuities (section 3.4); Determining term/rate (sections 3.5, 3.6)	
Test 1 – Friday, October 25 – 6:00 to 8:00 pm (2 hours) – Chapters/Sections TBA		
Oct 28-31, Nov 1	General annuities, mortgages, Perpetuities, (section 4.1-4.2-4.3)	
Nov 4-8	FALL READING WEEK	
Nov 11-15	Varying annuities (section 4.3), Amortization (section 5.1)	
In-class Quiz #3 – Tues/Wed, November 12/13 at start of class		
Nov 18-22	Outstanding balance, Refinancing, Sum of digits (section 5.2, 5.3, 5.4)	
Nov 25-29	Sinking Funds (sect 5.5/5.6/5.7) Bonds – Purchase price and callable bonds (sections 6.1/6.2/6.4)	
In-class Quiz #4 – Tues/Wed, November 26/27 at start of class		
Dec 2-4	Premium and Discount, (section 6.3); REVIEW	
Midterm Exam – To be scheduled during the December Exam period (3 hours)		
Week – 2020		
Jan 6-10	Price between dates, rate of return, other bonds (section 6.5, 6.6, 6.7)	
Jan 13-17	Net present value, internal rate of return, capitalized cost (sects 7.1-7.3)	
Jan 20-24	Depreciation (section 7.4); Fixed income investments, yield curve, forward interest rates (sections 8.1, 8.2),	
In-class Quiz #5 – Tues/Wed, January 21/22 at start of class		
Jan 27-31	Types of risks (section 8.3); Duration, convexity (sections 8.4 to 8.7)	
Feb 3-7	Probability, life tables probabilities (section 9.1 to 9.5)	
In-class Quiz #6 – Tues/Wed, February 4/5 at start of class		
Feb 10-14	Expectation of life, select mortality (section 9.6 and 9.7)	
Feb 17-21	WINTER READING WEEK	
Feb 24-28	Life Annuities, Pure endowments (section 10.1/10.2/10.3); Review	
Test 2 – Friday, February 28 – 6 pm to 8 pm (2 hours) – Chapters/Sections TBA		
Mar 2-6	Whole life, temporary and deferred life annuities, (section 10.4-10.6)	
Mar 9-13	Varying annuities, life annuities payable more than once a year, whole life insurance (section 10.7, 10.8, 11.1)	
In-class Quiz #7 – Tues/Wed, March 10/11 at start of class		
Mar 16-20	Whole life insurance (section 11.2, 11.3), Net Annual Premiums (11.4)	
Mar 23-27	Term, endowment, deferred, varying insurance (sect 11.5 to 11.8)	
In-class Quiz #8 – Tues/Wed, March 24/25 at start of class		
Mar 30-Apr 1	Expenses; Types of life insurance expenses (section 12.1, 12.2)/ Review	
Final Exam – To be scheduled in final exam period		

Classroom Environment

We have adopted a “Mutual Expectations” policy governing the classroom environment and all work submitted by students. [The full text of the policy can be found on the Statistical and Actuarial Science departmental web page, <http://www.uwo.ca/stats> or go directly to the web page: <https://www.uwo.ca/stats/undergraduate/mutual-expectations.html>].

In summary, all interactions between students and faculty should be governed by the principles of **courtesy, respect and honesty**.

Students are encouraged to ask questions in the class. Also any unnecessarily loud talking among students is to be discouraged. The goal is to reduce any behaviour by students that may disrupt other students

What Do You Do if You Miss a Course Requirement Due to Illness or Special Circumstances?

If you are unable to meet a course requirement due to illness or other serious circumstances, you must seek approval for the absence as soon as possible. Approval can be granted either through a self-reporting of absence or via the Dean’s Office/Academic Counselling unit of your Home Faculty. If you are a Social Science student, the Academic Counselling Office of the **Faculty of Social Science is located in SSC Room 2105**, or can be contacted at **ssaco@uwo.ca**. If you are a Science student, the Academic Counselling Office of the Faculty of Science is located in NCB 280, and can be contacted at scibmsac@uwo.ca.

For further information about absences, including the **self-reporting procedure** and requirements, please click on the following link (look at Section 3 on page 3): https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic_Consideration_for_absences.pdf

You may also be eligible to write a Special Exam if you are in a “Multiple Exam Situation” (see http://www.registrar.uwo.ca/examinations/exam_schedule.html).

For in-class quizzes: There are **NO make ups to any of the quizzes**, so if you miss one (or two) it will be one of the two quizzes that will not count towards your final mark. If you miss a third quiz, it will count as a mark of ZERO. You do not need to get in contact with your Faculty or your instructor if you miss a quiz (or two).

For Tests: If you miss a test for a valid reason, **there are no makeup tests**. The weight of the missed test will be moved to either the midterm exam (if Test 1 was missed) or the final exam (if test 2 was missed).

For Midterm/Final Exam: If you miss an exam for a valid reason, you must go to your Faculty with proof as to why you missed the exam. A **makeup exam** date will be arranged for all students who missed the exam with a valid reason.

If you require academic accommodation due to illness, you should use the Student Medical Certificate when visiting an off-campus medical facility. The form can be found here: http://www.uwo.ca/univsec/pdf/academic_policies/appeals/medicalform.pdf

The website for Registrarial Services is <http://www.registrar.uwo.ca>.

Attendance

The department of Statistical and Actuarial Sciences views classroom attendance as a very important part of the learning process. You are expected to attend all classes. You are advised that excessive absenteeism may result in being debarred from the final examination.

Policy on e-mail communication

E-mail can be an efficient and effective way to communicate with your Professor, but it should be used very rarely, only to provide us with information or to ask a question that requires a very brief response. We do not wish to see emails that ask “What did I miss in class today?”. For more lengthy discussions, you should raise questions after class or during office hours, or make a separate appointment if necessary. Please remember that we will only read e-mails from your UWO student account. E-mails from other accounts (e.g. hotmail, yahoo, etc.) will not be read.

Please conduct yourselves professionally if you choose to e-mail your Professor.

Support Services

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 Student Accessibility Services (SAS) at 661-2147 if you have any questions regarding accommodations.

The policy on Accommodation for Students with Disabilities can be found here:

https://www.uwo.ca/univsec/pdf/academic_policies/appeals/Academic%20Accommodation_disabilities.pdf

The policy on Accommodation for Religious Holidays can be found here:

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

Learning-skills counsellors at the Student Development Centre (<http://www.sdc.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.

Students who are in emotional/mental distress should refer to Mental Health@Western

(http://www.health.uwo.ca/mental_health) for a complete list of options about how to obtain help.

Accessibility

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 Services for Students with Disabilities (SSD) at 661-2111 ext. 82147 if you have questions regarding accommodation.