FM2557B Long Term Actuarial Mathematics
Course Outline

1. Course Information

Course Information
Course Name: Financial Markets and Investments
Course Number: FM2557B
Term: Winter
Location: TC-141 (Online delivery for at least the month of January)
Lecture hour: Tue 9:30 AM - 10:30 AM, Thu 9:30 AM - 11:30 AM
Tutorial: Thu 4:30 PM – 5:30 PM

List of Prerequisite(s) A minimum mark of 60% in Calculus 1501A/B or Applied Mathematics 1413, or Calculus 1301A/B with a minimum mark of 85%.

List of Antirequisite(s) Business Administration 4413A/B

Unless you have either the requisites for this course or written special permission from your Dean to enroll in it, you may be removed from this course and it will be deleted from your record. This decision may not be appealed. You will receive no adjustment to your fees in the event that you are dropped from a course for failing to have the necessary prerequisites.

2. Instructor Information

Instructors	Email	Office	Phone	Office Hours
Kyle Leistner	kleistne@uwo.ca	WSC272		Via zoom – book through email
Pramod Rao	ppurigal@uwo.ca			

Students must use their Western (@uwo.ca) email addresses when contacting their instructors.

3. Course Syllabus, Schedule, Delivery Mode

Interest rate determinants. Duration, convexity and immunization. Basic securities, financial market conventions, swaps, arbitrage pricing and hedging of forwards/futures, equity options, bonds, theories of the term structure, factors affecting option prices, arbitrage relations of calls and puts, trading strategies involving options.

Upon successful completion of this course, students will be able to:

- Describe the characteristics and terms of the main derivatives instruments (including forwards and futures).
    - Distinguish between long and short positions for both assets (including short selling of stocks) and derivatives on assets.
    - Recognize the transaction costs affecting profit calculations for both assets and derivatives on assets (including commissions and bid-ask spread).
- Describe the characteristics and terms relating to both forward contracts and prepaid forward contracts.
    - Define and recognize the following terms relating to the timing of stock purchases: outright purchase, fully leveraged purchase, prepaid forward contract, and forward contract.
    - Determine payoffs and profits for both long and short positions on forward contracts.
    - Calculate prices for both forward contracts and prepaid forward contracts on stocks with no dividends, continuous dividends, and discrete dividends.
    - Construct a synthetic forward from the underlying stock and a risk-free asset and identify arbitrage opportunities when the synthetic forward price is different from the market forward price.
- Describe the characteristics and terms relating to both futures contracts and the associated margin accounts.
    - Define and recognize the following terms relating to the mark-to-market process: Marking to market, margin balance, maintenance margin, and margin call.
    - Evaluate an investor's margin balance based on changes in asset values.
- Explain the cash flow characteristics and terms relating to various options.
    - Define and recognize the following terms relating to option classification: call and put options, expiration date, strike price, moneyness, and option style.
    - Calculate the payoff and profit on both long and short positions with respect to both call and put options.
    - Calculate the payoffs on exotic options: Asian (arithmetic and geometric), barrier, compound, gap, and exchange.
    - Calculate the payoffs on exotic options: lookback, chooser, shout, rainbow, and forward start.
- Apply option strategies in a risk management context.
    - Recognize that a long put can be used as an insurance strategy for a long stock position and a long call can be used as an insurance strategy for a short stock position.
    - Understand how the following option strategies can be used as tools to manage financial risk or speculate on price or volatility: option spreads (bull, bear, ratio), collar, straddle, strangle, and butterfly spread.
    - Evaluate the payoff and profit of the option strategies described above.
- Explain the general properties of options that affect option prices.
    - Apply put-call parity to European options on stocks with no dividends, stocks with continuous dividends, stocks with discrete dividends, currencies, and bonds.

- Compare options with respect to term-to-maturity and strike price.

Week	Dates	Topic	Instructor
			KL
1	Jan 10 – 14	Introduction to markets and derivatives Overview of stocks, bonds, and derivatives	KL
2	Jan 17 – 21	Buying, selling, and short selling Introduction to forwards, and how arbitrage works	KL
3	Jan 24 – 28	Continuing analysis of forwards and introducing the replicating portfolio Introduction to puts and calls	KL
4	Jan 31 – Feb 4	Put-call parity Midterm 1	KL
5	Feb 7 – 11	Various option strategies Introduction to using options to manage risk	KL
6	Feb 14 – 18	Deeper analysis of forwards with continuous dividends Introduction and analysis of futures contracts	KL
7	Feb 21 – 25	Reading Week	NA
8	Feb 28 – Mar 4	Deeper analysis of futures including asset allocation and cross hedging	KL
9	Mar 7 – Mar 11	Interest rate determinants Midterm 2	KL
10	Mar 14 – 18	Interest rate forwards, Eurodollar futures, and intro to duration and convexity	KL
11	Mar 21 – 25	Duration and convexity continued Asset-Liability matching	KL
12	Mar 28 – Apr 1	Introduction and analysis of swaps	KL
13	Apr 4 – Apr 8	Review for final exam	KL

Classes begin: January 10, 2021
Reading Week: February 19–27, 2022
Classes end: April 8, 2022

University Accreditation Program

This course is accredited under the Canadian Institute of Actuaries (CIA) University Accreditation Program (UAP) for the 2021-22 academic year. Achievement of the established exemption grade in this course may qualify a student from exemptions from writing certain preliminary exams.

Please see the following link for full details:

http://www.cia-ica.ca/membership/university-accreditation-program---home

In addition to the university's internal policies on conduct, including academic misconduct, candidates pursuing credits for writing professional examinations shall also be subject to the **Code of Conduct and Ethics for Candidates in the CIA Education System** and the associated **Policy on Conduct and Ethics for Candidates in the CIA Education System**.

Act Sci 2427B

This course with a minimum mark of 75%, along with Financial Modelling 2555A (minimum mark of 75%) and Financial Modelling 3520A (minimum mark of 80%), can give you an exemption for the IFM exam.

Contingency plan for an in-person class pivoting to 100% online learning
In the event of a COVID-19 resurgence during the course that necessitates the course delivery moving away from face-to-face interaction, all remaining course content will be delivered entirely online, either synchronously (i.e., at the times indicated in the timetable) or asynchronously (e.g., posted on OWL for students to view at their convenience). The grading scheme will **not** change. Any remaining assessments will also be conducted online as determined by the course instructor.

4. Course Materials

Text Book

Robert L. McDonald (2013). Derivatives Markets 3rd Edition, Pearson Education, ISBN 0-321-254308-4.

SOA Study Note

Michael A. Bean (2017). Determinants of Interest Rates. http://www.soa.org/Files/Edu/2017/fm-determinants-interest-rates.pdf

Students can order a physical copy through the Book Store's website and the books will be shipped directly to them. Alternatively, students can purchase an e-book version through the following link:

Link to be provided at a later date

Students are responsible for checking the course OWL site (http://owl.uwo.ca) on a regular basis for news and updates. This is the primary method by which information will be disseminated to all students in the class.

All course material will be posted to OWL: http://owl.uwo.ca.

If students need assistance with the course OWL site, they can seek support on the OWL Help page. Alternatively, they can contact the Western Technology Services Helpdesk. They can be contacted by phone at 519-661-3800 or ext. 83800.

5. Methods of Evaluation

The overall course grade will be calculated as listed below:

Midterm Exam 1	25%
Midterm Exam 2	30%
Final Exam	45%

Midterm 1 is one hour in length, Midterm 2 is 1.5 hours in length, and the Final Exam is three hours in length. The tentative dates for midterms 1 and 2 are February 3 and March 10 respectively. These dates need to be validated by the registrar's office. The final exam will be scheduled by the registrar's office.

Calculators: Any non-programmable calculator may be used in this course.

All evaluations are closed book.

Accommodated Evaluations

- The weight of a missed test will be transferred to the final exam
- If a make-up assessment is missed, the student will receive an INC and complete the task the next time the course is offered

Rounding of Marks Statement

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.

6. Student Absences

Academic Consideration for Student Absences

Students who experience an extenuating circumstance (illness, injury or other extenuating circumstance) sufficiently significant to temporarily render them unable to meet academic requirements may submit a request for academic consideration through the following routes:

(i) Submitting a Self-Reported Absence (SRA) form provided that the conditions for submission are met. To be eligible for a Self-Reported Absence:

- an absence must be no more than 48 hours
- the assessments must be worth no more than 30% of the student's final grade
- no more than two SRAs may be submitted during the Fall/Winter term

(ii) For medical absences, submitting a Student Medical Certificate (SMC) signed by a licensed medical or mental health practitioner to the Academic Counselling office of their Faculty of Registration.

(iii) Submitting appropriate documentation for non-medical absences to the Academic Counselling office in their Faculty of Registration.

Note that in all cases *other than an SRA*, students are required to contact their instructors within 24 hours of the end of the period covered, unless otherwise instructed in the course outline.

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. **All documentation required for absences that are not covered by the Self-Reported Absence Policy must be submitted to the Academic Counselling office of a student's Home Faculty.**

For the policy on Academic Consideration for Student Absences – Undergraduate Students in First Entry Programs, see:

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

and for the Student Medical Certificate (SMC), see:

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

Religious Accommodation
When a course requirement conflicts with a religious holiday that requires an absence from the University or prohibits certain activities, students should request accommodation for their absence in writing at least two weeks prior to the holiday to the course instructor and/or the Academic Counselling office of their Faculty of Registration. Please consult University's list of recognized religious holidays (updated annually) at

https://multiculturalcalendar.com/ecal/index.php?s=c-univwo.

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).

7. Accommodation and Accessibility

Accommodation Policies
Students with disabilities work with Accessible Education (formerly SSD), 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,

8. Academic Policies

The website for Registrarial Services is http://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 his/her official university address is attended to in a timely manner.

Any non-programmable calculator is permitted to be used during evaluations.

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:

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

In the event of a health lock-down where delivery is moved to online format, tests and examinations in this course will be conducted using a remote proctoring service. By taking this course, you are consenting to the use of this software and acknowledge that you will be required to provide **personal information** (including some biometric data) and the session will be **recorded**. Completion of this course will require you to have a reliable internet connection and a device that meets the technical requirements for this service. More information about this remote proctoring service, including technical requirements, is available on Western's Remote Proctoring website at:

https://remoteproctoring.uwo.ca.

9. Support Services

Please visit the Science & Basic Medical Sciences Academic Counselling 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/.

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 (519) 661-2147 if you have any questions regarding accommodations.

Western University is committed to a thriving campus as we deliver our courses in the mixed model of both virtual and face-to-face formats. We encourage you to check out the Digital Student Experience website to manage your academics and well-being: https://www.uwo.ca/se/digital/.

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/mentalhealth) for a complete list of options about how to obtain help.

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