Mathematical Finance (MaFi) 
Specialization 
@ Department of Mathematics & 
Statistics *

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Outline of Presentation

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Introduction: Mathematical Finance & Quantitative Analysts ("Quants")

As financial securities become increasingly complex, demand has grown steadily in Canada and around the world for people who not only understand the complex mathematical models that price these securities, but who are able to enhance them to generate profits and reduce risk.

These individuals are mathematical finance professionals, and are known as quantitative analysts, or simply "quants."
Introduction: Mathematical Finance & Quantitative Analysts ("Quants")

Due to the challenging nature of the work—a blend of mathematics, finance and computer skills—quants are in great worldwide demand. Quantitative analysis positions are found almost exclusively in major financial centres with trading operations. In Canada, Toronto and Calgary are the primary trading centres.

In the United States, New York and Chicago, and also areas where hedge funds cluster (e.g., Boston and Stamford) have the highest labour market demand. Internationally, London dominates, and in Asia and Oceania, many quants are working in Hong Kong, Singapore, Tokyo, and Sydney, among other regional financial centers.
Introduction: Mathematical Finance & Quantitative Analysts ("Quants")

Despite the heavy concentration in those cities, quants are found all over the world as many global firms analyze and/or trade complex securities.

In Canada, the mathematical finance professions fall under the National Occupational Classification (NOC) code 2161: mathematicians, statisticians and actuaries.
Introduction: Mathematical Finance & Quantitative Analysts ("Quants")

Our Mathematical Finance (MaFi) specialization is on since August 15, 2020.

The students enrolled in this program will have in their transcript after graduation 'mathematical finance' specialization instead of 'mathematics', as it was until 15/08/2020.
MaFi Specialization

MaFi specialization offers:

**Ph.D.** in Mathematical Finance

**M.Sc. (thesis-based)** in Mathematical Finance

**M.Sc. (course-based)** in Mathematical Finance
Admissions to MSc & PhD

For admission to the PhD program, the admissions committee recommends the following, in addition to the requirements for admission to the master's program:

- A course in mathematical finance
- A course in stochastic processes
- Courses in rigorous mathematics (advanced linear algebra, advanced calculus, differential equations, analysis)
- A course in theoretical or applied probability, and/or mathematical statistics at the graduate level
Admission to MSc & PhD: Background

The following background will be highly preferred:

- Courses in real analysis, and possibly measure theory, advanced probability (limit theorems, sigma fields), stochastic processes (e.g., Wiener, Poisson processes)
- A broad range of courses in statistical methods (statistical computing, Bayesian statistics, generalized linear models, time series, multivariate statistics)
- Undergraduate or graduate computer science courses
- Research or work experience relevant to mathematical finance or stochastic processes/probability/statistics
- Solid programming experience (e.g., C, C++, Fortran, Python, R, SAS, Matlab)
MSc: Thesis-and Course-based

M.Sc. specialization offers thesis- and course-based programs.

MSc (thesis-based) completion time: mostly 2 years (the maximum time allowed is 4 years)

MSc (course-based) completion time: 1-2 years (the maximum allowed time is 4 years)
Remark: In both programs, course performance level should be a minimum GPA of 3.00 calculated on a 4-point scale at the end of each registration year, and attain at least a B– on each course taken for credit
MSc & PhD Courses-List A-C

List A courses:
ACSC 515 Models for Financial Economics
MATH 681 Stochastic Calculus for Finance
MATH 683 Computational Finance

List B courses:
STAT 507 Introduction to Stochastic Processes
MATH 605 Differential Equations III
MATH 601 Measure and Integration
STAT 701 Theory of Probability I
STAT 721 Theory of Estimation
MSc & PhD Courses-List A-C

List C courses:
MATH 691.01 Introduction to Levy Processes with Applications in Finance
MATH 693.01 Monte Carlo Methods in Finance-Existing Course
MATH 691.05 Stochastic Optimal Control & Applications in Finance
MATH 693.03 Energy, Commodity and Environmental Finance
MATH 691.03 Credit Risk-Existing Course
MATH 693.05 Advanced Topics in Mathematical Finance
MSc & PhD Courses-List A-C

List C:
Haskayne Courses:
FNCE 645 Futures and Options
FNCE 667 Financial Risk Management
FNCE 631 Seminar in Financial Management (FinTech)
FNCE 799.05 Theory of Corporate Finance
FNCE 799.06 Asset Pricing
FNCE 799.07 Topics in Asset Pricing and Corporate Finance

Note: There are differential fees for FNCE 6XX MBA courses (the fee is attached to the course), and no differential fees for PhD courses FNCE 799.XX.
PhD: Course Load

MATH 600 Research Seminar
MATH 681 (see List A)
MATH 683 (see List A)
At least one additional course from List B
At least two additional courses from List B or List C
MSc (Thesis-based): Course Load

MATH 600 and five courses at graduate level which must include two courses from List A.

At least three courses (not counting STAT 600) have to be at or above 600 level.
MSc (Course-based): Course Load

MATH 600 and eight courses which must include two List A courses.

At least 4 courses (not counting MATH 600) have to be at or above 600 level.
Research Supervisors

- Alexander Badescu
- Jinniao Qiu
- Deniz Sezer
- Anatoliy Swishchuk
- Tony Ware
MaFi Activities

• Lunch at the Lab Finance seminar

• PIMS Math_Industry Workshops

• Fin-ML CREATE (NSERC) scholarships

• MITACS Internships

• Math Finance conferences, workshops, etc. and Much More
MSc Thesis-based vs. MSc Course-based

Grad students in MSc course-based stream have an opportunity to transfer from course-based program to thesis-based program provided they have a high profile courses performance and potential research abilities.

They may talk to our research supervisors in math finance about prospective research topics and problems.
References

MaFi (General):
https://science.ucalgary.ca/mathematics-statistics/research/research-areas/mathematical-finance

M.Sc. web:
https://science.ucalgary.ca/mathematics-statistics/future-students/graduate/programs/mathematical-finance-msc

Ph.D. web:
https://science.ucalgary.ca/mathematics-statistics/future-students/graduate/programs/mathematical-finance-phd
The End

Thank You!

Q&A time!