LOYOLA
UNIVERSITY CHICAGO
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QUINLAN
SCHOOL of BUSINESS

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Office Hours: Wednesday Prior to Class or By Appointment

Financial Mathematics & Modeling – FINC 621
Winter 2018-19, Wednesday 6:00 – 9:00PM Schreiber Center 405

Catalog Description
This course combines topics in data acquisition, mathematical modeling, and the R-programming language as applied to financial and risk modeling (FRM). It is the second in a sequence of two courses. Emphasis is placed on applied numerical techniques for analysis, and risk calculations. The course provides good insights in some of the interplay in current markets and at major financial institutions. It is assumed students have some prior knowledge of probability, statistics, and calculus.

Course Overview
This class introduces students to fundamental concepts in numerical techniques as applied to pricing options, calculating sensitivities and Greeks, different methods to compute market risk Value-at-Risk (VaR), Monte Carlo and historical simulations, scenario analysis, risk metrics, exposures, and hedges, as applied to equities, options and fixed income securities. Commensurate time is devoted to hands-on laboratory sessions leveraging the programming language R. Other topics include financial time series analysis, distribution and sampling. The combined lecture and lab sessions will enable students to develop a comprehensive, and practical approach to financial mathematics and modeling.

Course Objectives and Learning Outcomes
1. Good handle of statistical numerical techniques as applied to problems in finance
2. Explain core concepts and methodologies to calculate VaR, aggregation, testing, and limitations
3. Develop skills in financial data acquisition, analysis, and assessment
4. Gain programming skills using the R language as applied to Finance
5. Ability to generate and analyze portfolio risk reports combining different measurements

Course Materials
Required Book:
Computational Finance: An Introductory Course with R by Arratia Argimirio, Springer, 2014
Optional Book:
Value-at-Risk, Theory and Practice by Glyn A. Holton, Academic Press, 2003
Lab Resources
Students will have the opportunity to work with the R statistical package as applied to Finance.
Additional Resources
Additional notes, reading material and on-line references will be shared as needed during class

Weekly Course Outline

Class Week	Class Lecture & Lab Work	References
Session 1 – Nov 7	Valuation, Payoff, No-Arbitrage, and Getting Started with R	§1
Session 2 – Nov 14	Financial Time Series, Random Variables, Distributions and Moments	§2
	Thanksgiving	
Session 3 – Nov 28	Variance, Covariance, Correlation, Causality, and Time Series Modeling	§3, §4
Session 4 – Dec 5	Stochastic Differential Equations, and Numerical Differentiation	§5, Notes
Session 5 – Dec 12	Mid Term Exam (120mn)	
	Winter Break!	
Session 6 – Jan 16	Technical Analysis and Fundamentals	§6
Session 7 – Jan 23	Sampling Methods, and Monte Carlo Simulation	§5, Notes
Session 8 – Jan 30	Value-at-Risk (VaR) Calculation Methods, and Stress Testing	Notes
Session 9 – Feb 6	General Review	Notes
Session 10 – Feb 13	Final Exam (120mn)	

Grading Criteria

Assignments 30%, Mid-Term exam 30%, Final exam 40%.

Course Grading Scale		Loyola University Grading Weights	
A	100-93	A	4.00
A-	92-90	A-	3.67
B+	89-87	B+	3.33
B	86-83	B	3.00
B-	82-80	B-	2.67
C+	79-77	C+	2.33
C	76-73	C	2.00
C-	72-70	C-	1.67
D+	69-67	D+	1.33
D	66-60	D	1.00
F	59 and below	F	0.00

Quinlan School of Business Policies:

Attendance
Class attendance and participation are fundamental components of learning, so punctual attendance at all classes, for the full class meeting period, is expected of Quinlan students.

If you must miss a class or leave early, please notify in advance. You are responsible for any class assignments or requirements missed during an absence.

Make-Up Examinations
Loyola University academic policy provides that tests or examinations may be given during the semester or summer sessions as often as deemed advisable by the instructor. Because Quinlan faculty believe examinations represent a critical component of student learning, required examinations should be taken during the regularly scheduled class period. **Make-up examinations are discouraged**. Exceptions may be granted only by the faculty member or department chair, and only for unavoidable circumstances (illness verified by a signed physician's note, participation in intercollegiate athletic events, subpoenas, jury duty, military service, bereavement, or religious observance). A make-up final examination may be scheduled only with the permission of the appropriate Quinlan Assistant or Associate Dean.

Academic Integrity
All members of the Quinlan School shall refrain from academic dishonesty and misconduct in all forms, including plagiarism, cheating, misrepresentation, fabrication, and falsehood…Plagiarism or cheating on the part of the student in individual or group academic work or in examination behavior will result minimally in the instructor assigning the grade of "F" for the assignment or examination.

For further information about expectations for academic integrity and sanctions for violations, consult the complete Quinlan School of Business Honor Code and Statement of Academic Integrity on the Quinlan website:
http://www.luc.edu/media/lucedu/quinlanschoolofbusiness/pdfs/Honor-Code-Quinlan July2012.pdf