Math 575: Market and Credit Risk Models and Management
Spring 2017   WPI

Professor:	Marcel Blais	**Office Hours:**	To Be Announced
	Stratton Hall 104A		
	508-831-5677		
	myblais@wpi.edu		By Appointment

Class Info: Tuesday,   4:00pm – 5:15pm,   Kaven Hall 204
Thursday,   4:00pm – 5:15pm,   Kaven Hall 204
myWPI will be used to manage many of the course details.

Text: *Quantitative Risk Management. Revised Edition*, by Alexander McNeil, Rudiger Frey, & Paul Embrechts, ISBN 978-0-691-16627-8

Overview: The objective of the course is to familiarize students with the most important quantitative models and methods used to measure and manage financial risk, with special emphasis on market and credit risk. The course starts with the introduction of metrics of risk such as volatility, value-at-risk, and expected shortfall and with the fundamental quantitative techniques used in financial risk evaluation and management. The next section is devoted to market risk including volatility modeling, time series, non-normal heavy tailed phenomena, and multivariate notions of codependence such as copulas, correlations, and tail-dependence. The final section concentrates on credit risk including structural and dynamic models and default contagion and applies the mathematical tools to the valuation of default contingent claims including credit default swaps, structured credit portfolios, and collateralized debt obligations. (Prerequisite: knowledge of MA 528 and MA 571.)

Grading: The final grades will be computed using:
HW & Projects   75%
Midterm Exam   25%

Computing: Some assignments, including projects, will require computing resources. MATLAB, Python, Microsoft Excel, and Bloomberg will be used. Students will use paper trading accounts provided by Interactive Brokers LLC.

Exams: Midterm Exam,   Thursday March 2, 2017,   In Class

Make-up Exam Policy:
Make-up exams will only be allowed in the event of a documented emergency. You are responsible for avoiding conflicts with the exam and final presentations. Do not plan to leave campus for the semester before the midterm or final class.

Homework: There will be regular homework assignments. In general students are allowed to work together on homework assignments, but solutions must be written up independently.

Projects: There will be multiple projects assigned. These will be implemented using, Python, MATLAB and the Interactive Brokers paper trading account. Students may be required to present project results.

Late HW: Late assignments without prior consent of the professor will not be accepted and will receive a grade of 0. Extensions will be granted only in the event of unforeseen emergencies or extenuating situations that you discuss with the professor in advance.

Capstone: This course can be used as a capstone course for the Financial Mathematics
Option M.S. degree. Inform the instructor in the beginning of the course if you would like to take MA 575 as a capstone course. This requires instructor approval and depends on many factors. Extra work will be assigned for this option.

Additional References:

- *Risk Management and Financial Institutions,* by John C. Hull, ISBN 978-1-118-26903-9

- *Statistics and Finance: An Introduction*, by David Ruppert, ISBN 0-387-20270-6

- *Statistics and Data Analysis for Financial Engineering*, by David Ruppert, ISBN 978-1-4419-7786-1

- *Value at Risk*, by Philippe Jorion, ISBN 0-07-135502-2

- *Stochastic Calculus for Finance II: Continuous-Time Models*, by Steven Shreve, ISBN 0-387-40101-6

- *Derivative Securities, Second Edition,* by Robert Jarrow & Stuart Turnbull.

- *Options, Futures, and Other Derivatives, 7thEdition*, by John C. Hull.

- MATLAB materials: http://www.cs.cornell.edu/courses/cs99/2003su/

Academic WPI has an established academic honor code, described in *The WPI*
Honesty: *Student Judicial Policies and Procedures*. Each student is expected to familiarize him/herself with WPI's Academic Honesty policies which can be found at https://www.wpi.edu/about/policies/academic-integrity .
All acts of fabrication, plagiarism, cheating, and facilitation will be prosecuted according to the university's policy. If you are ever unsure as to whether your intended actions are considered academically honest or not, please see Prof. Blais.

Disability If you need course adaptations or accommodations because of a disability, or if
Services: you have medical information to share with me, please make an appointment as soon as possible. If you have not already done so, students with disabilities, who believe that they may need accommodations in this class, are encouraged to contact the Disability Services Office (DSO), as soon as possible to ensure that such accommodations are implemented in a timely fashion. The DSO is

located in Daniels Hall, its phone number is (508) 831-5235, and its website is https://www.wpi.edu/offices/office-disability-services.

This syllabus is subject to change at the instructor's discretion