

RISK MANAGEMENT SYSTEMS
INFO GB 3351
Preliminary Spring 2017

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 Class Times: Monday 6:00 – 9:00 p.m. Room T-415 (Tisch Building)
 Office Hours Monday 4:30-5:30 p.m., after class or by appointment, KMC 8-171
 Class-site: NYU Classes – all announcements, assignments, readings and class notes

Course Objectives

Soc Gen Trader loses billions due to a “**rogue trader**”. Citibank, ML, UBS, lose billions in CDO’s, Bear Stearns “saved” by JP Morgan Chase to avoid a global crisis in credit derivatives, Amaranth hedge fund losses \$7B in one week. These are not new stories but recurring crises going back many years. How did so many smart people lose so much money??? This course will explain what happened, examine a number of notorious cases, review what regulators are doing about it, (the new Basel III Accord), calculate Value at Risk and what you need to know to read and understand risk management reports, or architect and build or buy a risk management system.

In today’s world of rapid information flows, rising volatility, regulatory concerns and oversight, prudent management increasingly requires understanding and measuring risk. Merged or individual banks, securities dealers, insurance companies and industrial firms with significant financing operations, all require enterprise-wide risk management that may span many operations across currencies and locations in real time. Risk management establishes standards for aggregating disparate information, gathering market data, calculating risk measures and creating timely reporting tools for management market, credit, and operational risks. This course is directed toward students interested in understanding how large-scale complex risk can be quantified, needs to be managed and architected. We identify the business and technical issues, regulatory requirements and techniques to measure and report risk across a major organization.

Prerequisites – Course Audience

There are no required prerequisites for this course. However, to successfully understand the material, you should have a general understanding of US financial markets, trading and instruments, including stocks, bonds, futures and options. An ability to use basic MS Excel functionality is also required. Most Stern MBA students who currently work in the financial services industry or are majoring in finance have sufficient expertise. Alternatively, my spring Financial Information Systems course provides enough background.

This is not a programming or technical course but one aimed at those who will be using, building, buying or supporting risk management systems and need to understand the underlying business concepts of financial risk management. It is not a course in the risk management of computer systems. Its aim is not to train professional risk managers, (a program which Stern does offer), but has been successfully taken by trading and senior managers, compliance officers, auditors, regulators and anyone who needs a broad introduction to the topic.

If you do not have a finance background and still wish to take the course, please contact me as soon as possible for a reading list to help bring you up to speed.

Primary Texts (Required)

Jorion, Philippe, *Value at Risk: The New Benchmark for Managing Financial Risk*, 3rd edition, McGraw-Hill, 2007

Or (not both)

An alternative text, less mathematical and the basis of the Associate Professional Risk Management certification www.prmia.org/associate-prm-exam/what-is-the-associate-prm-certificate

Crouhy, Galai and Mark, *The Essentials of Risk Management*, 2nd ed., McGraw Hill, 2014

And

Roger Lowenstein, *When Genius Failed*, Random House, 2000

May be available at the NYU bookstore, but can be purchased on Amazon at a significant discount with free shipping.

Other Readings

Cases will be supplied on NYU Classes: Barings, Orange County, AIB, etc.

Current articles on risk management

Basel II Accord documentation: <http://www.bis.org/publ/bcbs107.htm>

Methodology

The class will be based on lectures, readings, case studies and guest speakers. Besides a mid-term and final exam, students will prepare assignments requiring the calculation of portfolio statistics and VaR and a Monte Carlo simulation using Microsoft Excel. There will be an assignment using the Barra risk management system available at Stern. All class notes and readings will be posted to the class NYU Classes website prior to each class. We will only use algebra and statistics in class. While more advanced math is used in the text, you can read it or skim over it as your background permits.

GRADING

Item	<u>Grade</u>
Midterm	45%
Final	45%
Class Participation and Homework	10%

CLASSROOM BEHAVIOUR (See Default Policies for Stern Courses, http://w4.stern.nyu.edu/academic/affairs/policies.cfm?doc_id=7511)

Rude and impolite behavior is disruptive. Therefore:

Stern rules state that you may not use cell phones, tablets or laptops, (even for receiving text messages) or other ELECTRONIC DEVICES OF ANY KIND, during class meetings.

You must TURN OFF all devices BEFORE class. If your phone rings, you will be asked to leave. Further I reserve the right to reduce your final grade by reducing points normally awarded for class participation. If you are on-call for work or family, just *place your device on vibrate and leave the room before taking the call.*

Arriving late interferes with other students' learning and is not acceptable. Subway delays and other problems are unavoidable on occasion, but it is each student's responsibility to plan carefully to arrive on time and well prepared. Repeated latecomers will be penalized. Classes are recorded and will be available the next day for students unable to attend a session. Repeated absences will affect class participation grades.

You may eat in class as long as it is not odiferous or noisy. There will be a break at about 7:30 when you can get “dinner”. Please clean up and throw away all trash.

As a mark of respect, I ask all men to remove their caps or hats while in class, unless worn for a religious reason.

This course has a “zero tolerance” policy on cheating and plagiarism. Any student who breaks academic rules in this course has violated the mutual trust on which teaching and learning are based and will not only receive a zero for that assignment, but will be excluded from taking any further quizzes or exams in this course, which is likely to result in a failing grade for the course. For serious infractions I will ask the University’s Disciplinary Panel to suspend the violator from all future courses. Remember that giving improper help is as clearly a violation as taking it. Please see the NYU Stern Code of Conduct.

If you have a qualified disability and will require academic accommodation during this course, please contact the Moses Center for Students with Disabilities (CSD, 998-4980) and provide me with a letter from them verifying your registration and outlining the accommodations they recommend. If you will need to take an exam at the CSD, you must submit a completed Exam Accommodations Form to them at least one week prior to the scheduled exam time to be guaranteed accommodation.

Your e-mail address

Be sure your email address in NYU Classes is correct. I will use it to communicate timely information about the course. To update your e-mail address in NYU Classes, log into NYU Home at <https://home.nyu.edu/>. Click Preferences at the top of the screen and then edit your Directory Address, which will be reflected in NYU Classes within 24 hours.

Syllabus
(Schedule Subject to Change – Refer to NYU Classes)

Topic 1

Background

First Class February 6th, 2017

The course – syllabus, grading, readings, etc.

Review of Modern Portfolio Theory, (EMH) and Behavioral finance

Reading: Crouhy Ch.5

Review of probability and statistics (if needed)

Topic 2

Intro to risk management

Types of risk – market, credit, liquidity, operational, etc.

Examples of financial disasters

Review and discuss Barings case

Reading: Jorion Ch 1 (except section 1.3), Ch 2 and Ch 4.2 or

Reading: Crouhy Ch.1 and Appendix

Barings case posted on NYU Classes, please read prior to class

Topic 3

Value at Risk --VaR

Risk measures for various asset classes

Historical VaR

Parametric VaR

Time scaling

Portfolio VaR

VaR Tools - Marginal, Component VaR, etc.

RAROC

Barings revisited

Calculating VaR of single equity using Excel and publicly available data

Homework #1 on calculating single instrument VAR and HW #2 on 2 asset VaR will be posted and due via email as announced in class.

Reading: Jorion Ch 1.3, Chapter 4 (except sections 4.2.2, 4.2.3 and 4.2.6)

Ch. 5.1 and 5.2 and Ch 7, Ch. 10 (Except sections 10.2.3, 10.2.5, 10.3.1, 10.A), Ch.14 or

Reading: Crouhy Ch.7 and Ch.17

Optional "Matrix Math" Appendix 7A or posted matrix math introduction

AIB case posted on NYU Classes, please read prior to class.

Topic 4

VaR II

Monte Carlo Simulation

Choice of Quantitative Measures

Measurement Errors

GARCH Volatility Models

Model Risk

Back Testing

Stress Testing

Fat Tails

Extreme Value Theory (EVT and CVaR)

Review and discuss Orange County case

Bring a printed copy of Homework #3 MC Simulation to class

Homework #3 Monte Carlo Simulation posted and due as announced in class.

Reading: Jorion Ch 5.3, 5.4 and Ch 6, Ch.7 (except section 7.4)

Skim Ch.9, Ch 21.3, Ch 12. (Except sections 12.2.3, 12.4, 12.5, 12.6) or

Reading: Crouhy Ch.15 and 16

Orange County case posted on NYU Classes, please read prior to class

Topic 5

Liquidity Risk

Liquidity Risk and Leverage

Hedge Fund Risk Measures

Reading: Jorion Ch 13 or

Reading: Crouhy Ch.8

First Exam Part I in Class date TBD

First Exam Part II Due by email and in class date TBD

Topic 6

Review Midterm Part I

When Genius Failed – LTCM case

Topic 7

Regulatory Environment

25 years of risk related regulations

BIS, Basel and Dodd Frank

Review for Midterm

Part I of Midterm, take home portion of midterm posted

Reading: Jorion Chapter 3 or

Reading: Crouhy Ch.3

Scan BIS site: www.bis.org and overview of new Basel III.5 Accord

Topic 8

Multifactor models

Discussion of multifactor analysis and Barra software

Barra system test cases

Reading: Jorion Ch 8 (except 8.2.4) and Barra specific readings will be posted on NYU Classes

Guest Speaker TBD

No Class March 13th Spring Break

Topic 9

Credit Risk

Systems addressing Credit Risk

Empirical, Accounting and Financial

Altman Z Score, Merton Model and Jarrow Models

Credit Metrics, etc. Credit Rating Systems

Reading: Jorion Ch 18 or

Reading: Crouhy Ch.9 and Ch. 10

Guest Lecture RiskMetrics Barra

Topic 10

2008 Crisis

Credit Default Swaps (CDS)

CDO's, CMO's and other structured finance

Tranching of Sub-prime CDOs

What happened to AIG?

SIVs and off balance sheet financing and lessons on credit risk management

Reading: Crouhy Ch.12

Topic 11

Operational Risk and its Basel requirements

Defining and organizing operational risk

CSAs, KRI's

Measuring Op Risk for VaR

Six Sigma and Balanced Scorecards for process improvement

Reading: Jorion. Ch 19 or

Reading: Crouhy Ch. 14

Second exam review

Second Exam

Last class May 8th or may be given online on NYU Classes