

University of Minnesota  
College of Science & Engineering  
FM 5031 Practitioner Sequence  
Module: Quantitative Risk Management (8 weeks)

Instructor: John Dodson

*DRAFT* October 28, 2020

This course is part of the Masters in Financial Mathematics (MFM) program required practitioner sequence. The objective of this course is to provide a grounding in applied probability and statistics as it relates to the measurement of financial risk. The material is mainly organized around the text *Quantitative Risk Management, Concepts, Techniques, and Tools (Revised Edition)* by Alexander McNeil, Rüdiger Frey, and Paul Embrechts. Quizzes and assignments motivate the acquisition of vocabulary, financial and mathematical concepts, and scientific computing techniques. Projects provide exposure to the practice of professional research.

## Sessions

There will be weekly class sessions for the last eight weeks of Fall semester.

Class sessions are scheduled for Wednesdays from 5:30 PM to 8:50 PM with a break at 7:00 PM. Classes will be held over Zoom.

Please note that your instructor lives out of state, but in the same timezone as the University.

<https://umn.zoom.us/my/jadodson>

The teaching assistant will be on-site during these sessions.

## Resources

The instructor will hold office hours on Sundays from 7:00 PM to 9:00 PM by Zoom. You may make alternate arrangements by contacting the instructor. You may contact the instructor at

<mailto:jdodson@math.umn.edu>

The class website is

<http://www-users.math.umn.edu/~dodso013/fm503/>

I will post slides in advance. I recommend you use the slides to take notes during the classroom session. The latest version of this document can also be found there.

Grades and feedback will be available at the Canvas learning management system

Fall <https://canvas.umn.edu/courses/195240>

The instructor and teaching assistant will moderate online discussions about assignment through the Piazza page at

<https://piazza.com/umn/fall2020/fm5031/home>

Rather than emailing questions about assignments, I encourage you to post your questions on Piazza.

## **Scientific Computing**

Some of the assignments will require scientific computing to solve. Software that facilitates interactive scientific computing include MATLAB<sup>TM</sup>, Mathematica<sup>TM</sup>, R, Python, and Julia. I expect you to be familiar with at least one of these. Demonstrations and solutions that I present will use Julia.

<https://julialang.org/>

## **Teaching Assistant**

Our teaching assistant is Zohreh Ebadi (ebadi003).

For the fall term, Zohreh will hold office hours Tuesdays starting at 4:30 PM on Zoom. See her Canvas notification for the room.

## **Texts**

The main text for the course is

QRM: *Quantitative Risk Management, Concepts, Techniques, and Tools (Revised Edition)*, by Alexander McNeil, Rüdiger Frey, and Paul Embrechts; published by Princeton University Press, ISBN 978-0-691-16627-8.

<https://press.princeton.edu/titles/10496.html>

also available in the University Bookstore.

## Schedule

Please complete the scheduled reading before each class session.

### FM 5031 module

Date	Subject	Reading
Wed 28 Oct	introduction	QRM ch. 1
Wed 4 Nov	basic concepts in risk management	QRM ch. 2
Wed 11 Nov	empirical properties of financial data	QRM ch. 3
Wed 18 Nov	financial time series	QRM ch. 4
Wed 25 Nov	extreme value theory	QRM ch. 5
Wed 2 Dec	multivariate models	QRM ch. 6
Wed 9 Dec	copulas and dependence	QRM ch. 7
Wed 16 Dec	aggregate risk	QRM ch. 8

## Evaluation

Grading will be based on three evaluation sources: weekly in-class short quizzes (10%), regular weekly homework (40%), and a larger assignment, which may be a group project, due one week after the last session (50%).

Attendance is required to earn quiz points; but a single lowest-scored quiz will not count towards the total to provide some accommodation for absences.

## Grading

Module grading is  $A-D$  with  $\pm$  (except  $A+$ ), according to the University's definitions:

- $A \leftarrow 4$  Achievement that is outstanding relative to the level necessary to meet course requirements.
- $B \leftarrow 3$  Achievement that is significantly above the level necessary to meet course requirements.
- $C \leftarrow 2$  Achievement that meets the course requirements in every respect.
- $D \leftarrow 1$  Achievement that is worthy of credit even though it fails to meet fully the course requirements.
- $F \leftarrow 0$  Represents failure (or no credit) and signifies that the work was either (1) completed but at a level of achievement that is not worthy of credit, or (2) was not completed and there was no agreement between the instructor and the student that the student would be awarded an  $I$ .
- $I \leftarrow \emptyset$  The incomplete shall be assigned at the discretion of the instructor when, due to extraordinary circumstances, the student was prevented from completing the work of the course on time. The assignment of an  $I$  for the sequence requires a written agreement between the affected instructors, the program management, and the student specifying the time and manner in which the student will complete the course requirements.

Grades (in terms of grade points 0–4) for FM 5031–2 modules are averaged at weights according to the number of weeks for each section. This module’s weight is  $\frac{8}{15}$ .

## **Academic integrity**

Academic integrity is essential to a positive teaching and learning environment. All students enrolled in University courses are expected to complete coursework responsibilities with fairness and honesty. Failure to do so by seeking unfair advantage over others or misrepresenting someone else’s work as your own, can result in disciplinary action. The University Student Conduct Code defines scholastic dishonesty as follows:

*Scholastic dishonesty* means plagiarizing; cheating on assignments or examinations; engaging in unauthorized collaboration on academic work; taking, acquiring, or using test materials without faculty permission; submitting false or incomplete records of academic achievement; acting alone or in cooperation with another to falsify records or to obtain dishonestly grades, honors, awards, or professional endorsement; altering, forging, or misusing a University academic record; or fabricating or falsifying data, research procedures, or data analysis.

Within this course, a student responsible for scholastic dishonesty can be assigned a penalty up to and including an *F* or *N* for the course. If you have any questions regarding the expectations for a specific assignment or exam, ask.

## **Instructor Policies**

### **Extra credit**

The instructor will not accept any work for extra credit.

## **University Policies**

Inquiries regarding any changes of grade should be directed to the instructor of the course; you may wish to contact the Student Conflict Resolution Center (SCRC) in 254 Appleby Hall (624-7272) for assistance. The Student Conflict Resolution Center website is

<http://www.sos.umn.edu/>

University policy prohibits sexual harassment as defined in the October 2017 Board of Regents policy statement, available at the Office of Equal Opportunity and Affirmative Action. Questions or concerns about sexual harassment should be directed to this office, located at 274 McNamara Alumni Center. Further guidance is available at

<https://policy.umn.edu/hr/sexharassassault>

The Board of Regent’s academic policies are available at

<https://regents.umn.edu/policies/index>

The Office for Community Standards website is

<https://communitystandards.umn.edu/>

which includes guidelines around academic dishonesty.

The University of Minnesota is committed to providing all students equal access to learning opportunities. The Disability Resource Center (DRC) works with students who have disabilities to provide and/or arrange reasonable accommodations.

- Students who have, or think they may have, a disability (e.g. mental health, attentional, learning, vision, hearing, physical or systemic), are invited to contact the DRC to arrange a confidential discussion at 612-626-1333 (V/TTY) or <mailto:drc@umn.edu>.
- Students registered with DRC, who have a letter requesting accommodations, are encouraged to contact the instructor early in the semester to discuss accommodations outlined in their letter.

Additional information is available at

<https://disability.umn.edu/>