

University of Minnesota
College of Science & Engineering
FM 5031 Practitioner Sequence
Module: Quantitative Risk Management (7 weeks)

Instructor: John Dodson

DRAFT September 3, 2021

This module 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

Class sessions are scheduled in Vincent Hall room 209 Mondays from 5:30 PM to 9:10 PM, with a break at 7:00 PM.

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:dodso013@umn.edu>

The class website is

<https://www-users.cse.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

<https://canvas.umn.edu/courses/269725>

Scientific Computing

Some of the assignments will require scientific computing to solve. Software that facilitates interactive scientific computing include MATLABTM, MathematicaTM, 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).

Zohreh will hold office hours TBD. 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/books/hardcover/9780691166278/quantitative-risk-management>

Schedule

Please complete the scheduled reading before each class session.

FM 5031 module

Date	Subject	Reading
Mon 13 Sep	basic concepts in risk management	QRM ch. 2
Mon 20 Sep	empirical properties of financial data	QRM ch. 3
Mon 27 Sep	financial time series	QRM ch. 4
Mon 4 Oct	extreme value theory	QRM ch. 5
Mon 11 Oct	multivariate models	QRM ch. 6
Mon 18 Oct	copulas and dependence	QRM ch. 7
Mon 25 Oct	aggregate risk	QRM ch. 8

Evaluation

Grading will be based on three 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* optionally modified with \pm (except no *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.

If you are enrolled in FM5031 after the withdrawal deadline, there are two ways a failure to achieve the minimum requirement for credit can be noted in your records:

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 The incomplete mark 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 $\frac{7}{14}$.

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/>

COVID-19, Face-Coverings, Symptoms, and Vaccination

The University of Minnesota currently requires all students, staff, and faculty to wear masks when indoors regardless of vaccination status, and strongly encourages members of the campus community to get vaccinated. Resources are available for accessing vaccines.

Please stay at home if you experience symptoms of COVID-19 and consult with your healthcare provider about an appropriate course of action. An absence due to symptoms of COVID-19 is an excused absence, and I will work with you to find the best course of action for missed work and/or class experiences.

Please see below for additional details:

- People who are not vaccinated are at high risk for getting and spreading SARS-CoV-2, the virus that causes COVID-19. New variants of the virus spread more easily and quickly, particularly among young adults, which may lead to more cases of COVID-19 among college students this fall. An increase in the number of COVID-19 cases will strain healthcare resources and lead to more hospitalizations and potentially deaths.
- The best defenses against contracting COVID-19 and spreading the virus to others are vaccination and masking. All members of the University community who can be vaccinated are strongly encouraged to get vaccinated. For resources about the vaccination and how to schedule an appointment, please refer to the University's Get the Vax initiative.
- When indoors, you are currently required to wear a face covering (mask) to protect the entire community of students, faculty members, and staff. This will maintain a culture of safety to help protect all members of the community, and especially those who are immunocompromised and/or who are caretakers of others (e.g., young children) who are not yet vaccinated.
- If you experience COVID-19 symptoms or symptoms of any potentially infectious respiratory illness (e.g., fever or chills, cough, shortness of breath or difficulty breathing, new loss of taste or smell, sore throat, congestion or runny nose), you should stay home or in your residence hall room and not come to class. Please consult with your healthcare provider about an appropriate course of action, and please consult the M-test program for COVID testing resources. Such an absence is an excused absence.

Note that the pandemic guidelines update regularly in response to guidance from health professionals and the prevalence of the virus in our community. You will be notified of any changes.