

Quantitative Finance
Course Number: 22:839:571
Course Title: Financial Modeling I

COURSE DESCRIPTION

This is a quantitatively-oriented financial economics course for the Master of Quantitative Finance (MQF) students. The course covers the basic concepts and analytical techniques of modern portfolio theory and asset pricing. Topics include Fisher separation, risk analysis using expected utility theory, mean-variance analysis, capital asset pricing model, arbitrage pricing theory, state preference theory, consumption-based asset pricing, market efficiency, empirical tests of asset pricing models, and market anomalies.

COURSE MATERIALS

Main Text

Pennacchi, George, 2008, *Theory of Asset Pricing*, Pearson Addison-Wesley, ISBN 13-978-0-321-12772-0-4.

Other References

1. Francis, Jack Clark and Dongcheol Kim, 2013, *Modern Portfolio Theory*, Wiley, 978-1-118-37052-0.
2. Huang, Chi-fu and Robert Litzenberger, 1988, *Foundations for Financial Economics*, Prentice-Hall, ISBN 0-13-500653-8.
3. Back, Kerry, 2017, *Asset Pricing and Portfolio Choice Theory*, 2nd ed., Oxford University Press, ISBN 978-0-19-024114-8.
4. Ang, Andrew, 2014, *Asset Management*, Oxford University Press, ISBN 978-0-19-995932-7.
5. Copeland, Thomas E. and J. Fred Weston, 2005, *Financial Theory and Corporate Policy*, 4th ed., Addison-Wesley Publishing Company, ISBN 0-321-12721-8.
6. Cochrane, John, 2005, *Asset Pricing*, second edition, Princeton University Press, ISBN 978-0-691-12137-6.
7. Campbell, John Y., Andrew W. Lo and A. Craig MacKinlay, 1997, *The Econometrics of Financial Markets*, Princeton University Press, ISBN 0-691-04301-9.

POLICY ON ELECTRONIC DEVICES IN THE CLASSROOM

Students are not allowed to use the computer or other electronic devices to chat, email or surf the internet in class. Unauthorized use of the computer or other electronic devices during an exam will be considered cheating and will result in the immediate failure of the course.

ACADEMIC INTEGRITY

I do NOT tolerate cheating. Students are responsible for understanding the RU Academic Integrity Policy <http://academicintegrity.rutgers.edu/>

I will strongly enforce this Policy and pursue *all* violations. On all examinations and assignments, students must sign the RU Honor Pledge, which states, “On my honor, I have neither received nor given any unauthorized assistance on this examination or assignment.” I will screen all written assignments through *SafeAssign* or *Turnitin*, plagiarism detection services that compare the work against a large database of past work. Don’t let cheating destroy your hard-earned opportunity to learn. See business.rutgers.edu/ai for more details.

GROUP PROJECT

The class will be divided into groups, each of which consists of no more than 5 students. Each group is required to do a simple portfolio investment project. A notional \$1 million is provided for your investment. Trading is restricted to the 30 stocks in the DJIA and the 1-month T-bill. Short sale and margin trading are both allowed. Assume a one-way transaction cost of 20 basis points for trading stocks. Securities are bought/sold once a week (every t) for 15 weeks (T). You must report to me your transactions every Friday after trading by e-mail, or I will assume that you do not trade in that week. Each purchase/sale should be justified on the basis of current market conditions and finance principles. Each group will write a report and do a presentation in class. Your report must explain the rationale of your trading, report the weekly profit and loss of your portfolio and provide key summary statistics of the portfolio performance over the trading period. In particular, the summary statistics must include the following: portfolio mean return, standard deviation, t-ratio of mean return (and statistical significance), excess return over the T-bill (and statistical significance), excess return over the DJIA return (and statistical significance), Sharpe ratio, market beta, market alpha (and statistical significance), Fama-French betas, Fama-French alpha (and statistical significance), Treynor measure ($(\bar{r}_p - \bar{r}_f) / \sigma_p$), M^2 measure (portfolio outperformance relative to the market), appraisal ratio ($\sigma_p / \sigma_{\text{market}}$), best weekly return, worst weekly return, number of winning weeks, number of losing weeks, and maximum consecutive losing weeks. You should do the analysis on a before cost basis and on an after-cost basis. The final report is due. You are graded on the performance of your portfolio as well as the quality of your analysis.

GRADING POLICY

1. Exam I, , 30%
2. Exam II, , 30%
3. Problem sets, 20%

4. Group project, 15%, due
5. Class participation, 5%

Active class participation is extremely important and can affect your grade.

Exams are close-book, close-note. Homework must be submitted in hardcopy.

TOPICS COVERED

(tentative, subject to change)

I. Review of Expected Utility Theory and Risk Aversion

Pennacchi, 1; Copeland-Weston, 3; Huang-Litzernberger, 1, 2; Francis-Kim, 4

II. The Mean-Variance Analysis

Pennacchi, 2; Copeland-Weston, 5; Huang-Litzernberger, 3; Francis-Kim, 5, 6, 7

III. Market Equilibrium, CAPM and Factor Models

Pennacchi, 3; Copeland-Weston, 6; Huang-Litzernberger, 4; Francis-Kim, 12, 13

IV. State Preference Theory and Equilibrium under Complete Markets

Pennacchi, 4; Copeland-Weston, 4; Huang-Litzernberger, 5

V. Market Efficiency and Test of Asset Pricing Models

Copeland-Weston, 6; Campbell, et al, 5, 6; Cochrane, 12, 15; Francis-Kim, 14

VI. Market Anomalies and Active Investment Strategies

Notes to be distributed

VII. Multi-period Portfolio Choice and Asset Pricing (if time allows)

Pennacchi, 5, 6

Appendix

30 Companies in the DJIA Index			
Company	Exchange	Symbol	Industry
3M	NYSE	NYSE: MMM	Conglomerate

American Express	NYSE	NYSE: AXP	Financial services
Apple Inc.	NASDAQ	AAPL	Information technology
Boeing	NYSE	NYSE: BA	Aerospace manufacturer and Arms industry
Caterpillar Inc.	NYSE	NYSE: CAT	Construction and Mining
Chevron Corporation	NYSE	NYSE: CVX	Petroleum industry
Cisco Systems	NASDAQ	CSCO	Information technology
Dow Inc.	NYSE	NYSE: DOW	Chemical industry
ExxonMobil	NYSE	NYSE: XOM	Petroleum industry
Goldman Sachs	NYSE	NYSE: GS	Financial services
IBM	NYSE	NYSE: IBM	Information technology
Intel	NASDAQ	INTC	Information technology
Johnson & Johnson	NYSE	NYSE: JNJ	Pharmaceutical industry
JPMorgan Chase	NYSE	NYSE: JPM	Financial services
McDonald's	NYSE	NYSE: MCD	Food industry
Merck & Co.	NYSE	NYSE: MRK	Pharmaceutical industry
Microsoft	NASDAQ	MSFT	Information technology
Nike	NYSE	NYSE: NKE	Apparel
Pfizer	NYSE	NYSE: PFE	Pharmaceutical industry
Procter & Gamble	NYSE	NYSE: PG	Fast moving consumer goods
The Coca-Cola Company	NYSE	NYSE: KO	Food industry
The Home Depot	NYSE	NYSE: HD	Retailing
The Travelers Companies	NYSE	NYSE: TRV	Financial services
The Walt Disney Company	NYSE	NYSE: DIS	Broadcasting and entertainment
United Technologies	NYSE	NYSE: UTX	Conglomerate
UnitedHealth Group	NYSE	NYSE: UNH	Managed health care
Verizon	NYSE	NYSE: VZ	Telecommunication
Visa Inc.	NYSE	NYSE: V	Financial services
Walgreens Boots Alliance	NASDAQ	WBA	Retailing
Walmart	NYSE	NYSE: WMT	Retailing

SUPPORT SERVICES

If you need accommodation for a *disability*, obtain a Letter of Accommodation from the Office of Disability Services. The Office of Disability Services at Rutgers, The State University of New Jersey, provides student-centered and student-inclusive programming in compliance with the Americans with Disabilities Act of 1990, the Americans with Disabilities Act Amendments of 2008, Section 504 of the Rehabilitation Act of 1973, Section 508 of the Rehabilitation Act of 1998, and the New Jersey Law Against Discrimination. More information can be found at ods.rutgers.edu.

[Rutgers University-New Brunswick ODS phone (848)445-6800 or email dsoffice@echo.rutgers.edu]

[Rutgers University-Newark ODS phone (973)353-5375 or email ods@newark.rutgers.edu]

If you are *pregnant*, the Office of Title IX and ADA Compliance is available to assist with any concerns or potential accommodations related to pregnancy.

[Rutgers University-New Brunswick Title IX Coordinator phone (848)932-8200 or email jackie.moran@rutgers.edu]

[Rutgers University-Newark Office of Title IX and ADA Compliance phone (973)353-1906 or email TitleIX@newark.rutgers.edu]

If you seek *religious accommodations*, the Office of the Dean of Students is available to verify absences for religious observance, as needed.

[Rutgers University-New Brunswick Dean of Students phone (848)932-2300 or email deanofstudents@echo.rutgers.edu]

[Rutgers University-Newark Dean of Students phone (973)353-5063 or email DeanofStudents@newark.rutgers.edu]

If you have experienced any form of *gender or sex-based discrimination or harassment*, including sexual assault, sexual harassment, relationship violence, or stalking, the Office for Violence Prevention and Victim Assistance provides help and support. More information can be found at <http://vpva.rutgers.edu>.

[Rutgers University-New Brunswick incident report link: <http://studentconduct.rutgers.edu/concern/>. You may contact the Office for Violence Prevention and Victim Assistance at (848)932-1181]

[Rutgers University-Newark incident report link: https://cm.maxient.com/reportingform.php?RutgersUniv&layout_id=7 . You may also contact the Office

of Title IX and ADA Compliance at (973)353-1906 or email at TitleIX@newark.rutgers.edu. If you wish to speak with a staff member who is confidential and does **not** have a reporting responsibility, you may contact the Office for Violence Prevention and Victim Assistance at (973)353-1918 or email run.vpva@rutgers.edu]

If students who have experienced a temporary condition or injury that is adversely affecting their ability to fully participate, you should submit a request via <https://temporaryconditions.rutgers.edu>.

If you are a military **veteran** or are on active military duty, you can obtain support through the Office of Veteran and Military Programs and Services. <http://veterans.rutgers.edu/>

If you are in need of **mental health** services, please use our readily available services.

[Rutgers University-Newark Counseling Center: <http://counseling.newark.rutgers.edu/>]

[Rutgers Counseling and Psychological Services–New Brunswick: <http://rhscaps.rutgers.edu/>]

If you are in need of **physical health** services, please use our readily available services.

[Rutgers Health Services – Newark: <http://health.newark.rutgers.edu/>]

[Rutgers Health Services – New Brunswick: <http://health.rutgers.edu/>]

If you are in need of **legal** services, please use our readily available services: <http://rusls.rutgers.edu/>

Students experiencing difficulty in courses due to **English as a second language (ESL)** should contact the Program in American Language Studies for supports.

[Rutgers–Newark: PALS@newark.rutgers.edu]

[Rutgers–New Brunswick: eslpals@english.rutgers.edu]

If you are in need of additional **academic assistance**, please use our readily available services.

[Rutgers University-Newark Learning Center: <http://www.ncas.rutgers.edu/rlc>]

[Rutgers University-Newark Writing Center: <http://www.ncas.rutgers.edu/writingcenter>]

[Rutgers University-New Brunswick Learning Center: <https://rlc.rutgers.edu/>]

[Optional items that many faculty include:

- Students must sign, date, and return a statement declaring that they understand the RU Academic Integrity Policy.

- Students must sign, date, and return a statement declaring that they understand this syllabus.]