

**Quantitative Finance**  
**Course Number: 22:839:603**  
**Course Title: Investment Analysis and Management**

## **THE COURSE**

Students taking this course should expect to learn about financial decision making from an investor's perspective. The course will focus on the fundamental principles of investment management, fixed income securities, futures and options, and risk and return, and more importantly, on how to apply these principles to real world problems.

There are two goals for the course. First, to provide students with a theoretical framework they can apply to help break down and understand complicated investment strategies that are commonly used by corporations and investment managers. Second, to provide students with the technical skills necessary for a career in investments, be it within a corporation or an investment firm. Both sets of skills will be developed through case studies, homework assignments, lectures, and discussions.

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## **COURSE RESOURCES**

Powerpoint Slides: Available from course website

Online Lectures: Available from course website

Additional Readings: Available from course website

Class Meeting Notes: Available from MS Teams

Harvard Business School Cases: <https://hbsp.harvard.edu/import/743293>

There are **four** Harvard Business Cases used in this course. It can be downloaded via the link provided above. Harvard charge \$4.25 per case and each group only need to obtain one copy.

There is no textbook required for this class. Investments textbooks are very expensive, and while there are a number of excellent textbooks available on the topic of investment management, none cover all

of the topics to be discussed in this class. I have multiple copies of these textbooks which I am happy to let you borrow. If you want to purchase a book, I would recommend looking at all the available books first. They differ substantially in their content:

Bodie, Kane, and Marcus, Investments, 5<sup>th</sup>-10<sup>th</sup> edition (McGraw Hill): A good overview of many topics. Not very technical, and relatively little emphasis is placed on how to implement theories and strategies in reality.

Elton, Gruber, Brown, and Goetzmann, Modern Portfolio Theory and Investment Analysis, 6<sup>th</sup> -9<sup>th</sup> edition (Wiley): Doesn't cover as many topics as BKM, but the topics it covers are covered in more detail. The mathematical content is substantially greater than that in BKM.

Grinold, and Kahn, Active Portfolio Management, 2<sup>nd</sup> Edition (McGraw Hill): This book focuses on how to form portfolios that will earn abnormal returns. As such, the authors assume that readers understand many important concepts, such as the CAPM, prior to reading the book. A good book for students with a strong interest in active portfolio management.

Benninga, Financial Modeling, 2<sup>nd</sup> – 4<sup>th</sup> Edition (MIT Press): The focus of this book is on how to apply financial theory in reality. Rather than carefully describing financial theory, Benninga focuses on how you operationalize the theory in Microsoft Excel. The book covers the vast majority of empirical applications covered in this class, but the writing style is terse. A great book if you want to learn more about Excel and how to program in Visual Basic.

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## **IS THE COURSE RIGHT FOR YOU?**

The course will be intellectually demanding, with an emphasis on applying finance theory to real world situations. You will be introduced to techniques that are commonly used in both industry and academia. The course, at times, will deal with complex analytic concepts and quantitative analysis, but will not focus on mathematical derivations or modeling. The workload will be heavy. You will be expected to conduct extensive analysis in Excel. This is not the course for you if you are looking for a “hot topic” course or a fast-track way to make money in the markets.

The prerequisite for the course is Finance 587 – Financial Management. The course requires students to understand the following concepts:

- Discounted cash flows and net present value
- Calculating returns
- Basic statistics (mean, variance, standard deviation, covariance, and correlation)
- Regression analysis □ Differentiation

If you are shaky on these topics, then dust off your old notebooks now and get yourself up to speed with this material. You should also be comfortable using Microsoft Excel.

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## **TEACHING METHOD**

To help students learn effectively I use two related teaching techniques, active learning and experiential learning. Active learning consists of two components – out-of-class learning and in-class learning. Out-of-class learning involves watching video lectures online prior to attending each class. The out-of-class lectures work through topics in detail. In-class learning involves the discussion of conceptual questions to get you thinking carefully about the topics you have been studying in the outof-class lectures (active learning), and applications of the concepts to real world problems (experiential learning).

Out-of-class learning:

Students are required to watch pre-recorded lectures (recorded by ()) before attending each class. The pre-recorded lectures typically last for 15 - 25 minutes each. To incentivize you to watch the lecture prior to coming to class, you will have to complete a short multiple-choice quiz on CANVAS before the start of each class. You score either zero, one, two points on each quiz, and these points count towards 15% of the final grade. Quizzes are graded as follows: 0% - 35% = 0; 35% - 70% = 1; 70% - 100% = 2

In-class learning:

In-class lectures typically take the following format:

1. A discussion of the latest events in the economy and their impact on financial markets and corporations.
2. Conceptual and numerical questions based on the video lectures for that day.
3. Discussion of a real-world example using the concepts covered.
4. Applying concepts to homework problems.

The classes are meant to be fun and interesting for students. Students are expected to contribute frequently. This format should challenge you to think critically about concepts rather than focusing on memorization.

The class format is the reverse of a typical class. I require you to watch video lectures outside the classroom to grasp the key concepts. In class, we build on these concepts and apply them to homework problems. Nearly all homework problems will be completed during class time.

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## 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](https://business.rutgers.edu/ai) for more details.

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## GROUPS

Working effectively in groups is an important skill to learn. You will work in groups of three or four students to complete ALL homework assignments. During classes group members will be required to join pre-assigned breakout rooms as classes will involve considerable within-group discussions.

When groups are initially formed on the first day of class, each group will be asked to draw up and sign a one-page contract regarding the expectations the group members have about what it takes to be a good, considerate group member. As a group member, you will be expected to abide by the terms of the contract. In an extreme situation in which a group member has consistently violated the terms of the contract, the remaining group members may fire the group member, but only with the instructor's permission. If a group member is fired, he/she will have to complete the homework assignments individually.

There will be 12 graded homework assignments to be completed in groups. These assignments will count towards 45% of your final grade. Each group will be asked to submit one set of answers for each assignment on **Microsoft (MS) Teams**<sup>1</sup>. Late assignments will not be accepted except for the most serious of reasons.

Assignment	Due Date	Points
Homework 1: Draw up and sign group contracts	Week 1	2
Homework 2: Financial Planning	Week 1	3
Homework 3: Uncertainty and Financial Planning	Week 2	5
Homework 4: Short Selling Strategies	Week 4	5
Homework 5: United Airlines	Week 4	4
Homework 6: Bond Duration Analysis	Week 5	3
Homework 7: Duration and Bond Arbitrage	Week 6	3
Homework 8: Forward Arbitrage and Option Values	Week 7	4
Homework 9: Swap Spread Arbitrage	Week 8	3
Homework 10: Finding Beta	Week 11	5
Homework 11: CAPM vs Fama-French 3-factor model	Week 12	4
Homework 12: Fund Performance (Blackstone)	Week 13	4

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<sup>1</sup> You can find the information on Canvas under "How-to" Folder: How to use MS Teams in Zoom class meetings: Part II

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## CLASS MEETINGS

I expect that students watch the pre-recorded video lectures, read assigned readings, and complete online quizzes before class. Students will be required to join pre-assigned breakout rooms in class. Students are responsible for all announcements made on Canvas and in class.

Most classes will focus on solving either conceptual or numerical problems. I will be using a polling software called “Turning Point” for most in-class polls. You can download the TurningPoint app from the Google Play or App Store for free, or you can go to [tpoll.com](http://tpoll.com) to respond to questions if you do not have a smart phone.

If you do not have an existing subscription with turning point from other classes (\$24.99 per year for all classes that use turning point) and/or have not yet linked your subscription to canvas, please register and link your account before the first day of the class. Note that all you need is a subscription. You do not need to purchase clickers.<sup>2</sup>

To join polling sessions during classes, you just need to open the app or go to [tpoll.com](http://tpoll.com) and input our session ID “()”. You can also watch a 2-minutes video on how to download and use the app here: [Turning Point app overview](#).

You should have a calculator and a computer that has a camera, a microphone, and MS office software for every class.

Some students may use Apple Computers. The functionality of Excel differs across Apple and Windows-based computers. I will be teaching using a Windows-based computer. I will not be able to provide additional support for people using Apple computers as I only use Windows-based computers. Note that Chromebook does not work well for a lot of in-class assignments using Excel.

All cell phones must be switched off prior to the start of class unless you are using it to answer polling questions. I consider the use of cell phones during class to be rude and inconsiderate to your fellow students.

As most of the in-class meetings involve polling, group discussions, and group homework, I will not be recording in-class meetings, but will distribute all in-class notes and Excel work on “MS Teams” (such as solving questions on traditional whiteboard).

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## OTHER POLICIES

Fairness:

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<sup>2</sup> See How to Add/Purchase a Subscription from Turning Point polling posted on canvas under “How-to” Folder.

I strive to treat students with dignity and fairness and to be particularly sensitive to the diversity that exists within the student body. No discriminatory remarks should be with regard to gender, race, age, ethnicity, sexual orientation, or disability. If you have a disability that may require some modification of seating, testing, or any other class requirement, please let me know as soon as possible so that appropriate arrangements can be made. Additional assistance is available from the [Office of Disability Services for Students](#).

#### Absences and Late Assignments:

As a matter of courtesy, I would appreciate an email or phone message if you unable to attend class. Late assignments will not be accepted for credit, except for the most serious of reasons.

#### Contacting the Instructor:

Emails should ONLY be used for matters related to COURSE ADMINISTRATION. I will NOT answer technical questions via email. I am happy to discuss issues of concern to you on an individual basis during office hours. If you are unable to attend regular office hours an individual appointment can be set up. I ask that you let me know the subject matter so that I can be prepared.

#### Appeals:

Grading errors should be corrected. Appeals must be in writing and include a description of the question that needs to be re-examined as well as an explanation of why the original grade was incorrect. In general, the entire document will be checked for grading errors, and correcting any errors could either raise or lower the overall score.

#### Academic Misconduct:

It is my sincere hope that no student in this class submits work that is not his or her own. If I determine that any assignment was not written solely by the student whose identification number appears on the assignment, the student will be reported to the Academic Integrity Review Committee which recommends appropriate sanctions to the Office of Student Conduct. There will be no exception to this rule. Please visit the following website for more information on the University's Code of Academic Integrity and possible sanctions: <http://academicintegrity.rutgers.edu/academicintegrity-at-rutgers>.

#### Grievance Policy:

Student concerns regarding this course should first be discussed with me, the faculty member teaching this course. If we can't resolve the complaint, you may contact ().

## COURSE EVALUATION

Your final grade will be based on points earned in exams, group assignments, online quizzes, and class participation. These items will be weighted according to the following schedule:

Individual Classroom Contribution	15%
Online Quizzes	15%
Group Assignments	45%
Exams	25%

The grade distribution in the course is likely to follow the distribution outlined below:

A	35%
B	50%
C	15%
D or F	0%

I reserve the right to alter the distribution as I deem necessary.

Individual Classroom Contribution:

Class participation is an important part of the course. I consider such things as asking thoughtful questions, attendance, respecting your fellow classmates' views on particular issues, contributing to a positive atmosphere in the class, and preparation for the scheduled lecture topic as class participation.

Exams:

Absence from the exams will not be excused except for the most serious reasons. Such serious circumstances must be validated in writing by an appropriately accredited professional (i.e. medical doctor).<sup>3</sup> The exams will cover material from lectures, assigned readings, and assigned problems. The goal is to test the level of comprehension and not merely the memorization skills of the student. There will be no formula sheet.

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## COURSE SCHEDULE

Week 1: Introduction and Financial Planning theory.

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<sup>3</sup> Students are allowed to make up examinations which have been missed due to illness, mandatory religious obligations, University activities, or other unavoidable circumstances.

Watch the following online video lectures prior to class:

- a. Interest Rates and Compounding
- b. Time Value of Money
- c. Time Value of Money: More challenging examples
- d. Time Value of Money: An annuity due

In-class lecture involves calculations. Bring a calculator and/or computer Homeworks 1 and 2 due by the end of class.

#### Week 2: Financial Planning meets reality

In-class lecture involves the use of Excel. Bring a Laptop if you have one. Homework 3 due by the end of class.

#### Week 3: Valuing and Trading Stocks

Watch the following online lectures prior to class:

- a. Valuing Stocks
- b. Trading Stocks

Complete online quiz prior to class.

Required Reading: [“Does Value Investing Still Make Sense?”](#), [“Is \(Systematic\) Value Investing Dead?”](#)

In-class lecture involves the use of Excel and numerous calculations. Bring a calculator and a Laptop if you have one.

Start Homework 4.

#### Week 4: How Markets Work

Watch the following online lectures prior to class:

- a. How markets work
- b. Market efficiency

Complete online quizzes prior to class.

In-class lecture involves calculations. Bring a calculator.

Required Reading for Discussion: Front-running and Flash Trading Homework 4 due at the start of class.

Homework 5 due by the end of class.

#### Week 5: Bond Pricing

Watch the following online video lectures prior to class:

a. Bond Basics

Complete online quiz prior to class.

Required Reading for Discussion: Walt Disney Sleeping Beauty Bonds Duration Analysis(1<sup>st</sup> Harvard Business Case)

Homework 6 due by the end of class.

Week 6: Advanced Bond Pricing

Watch the following online video lectures prior to class:

- a. Bond Valuation using STRIPs
- b. Bond Valuation using Bootstrapping Complete online quiz prior to class.

In-class lecture involves the use of Excel. Bring a Laptop if you have one.

Required Reading for Discussion: Fixed Income Arbitrage in a Financial Crisis (A): US Treasuries in November 2008 (2<sup>nd</sup> Harvard Business Case) Homework 7 due by the end of class.

Week 7: Futures, Forwards, and Options

Watch the following online lectures prior to class:

- a. Forwards and Futures
- b. Options

Complete online quizzes prior to class.

Required Reading for Discussion: The Arithmetic of Active Management

In-class lecture involves calculations. Bring a calculator. Homework 8 due by the end of class.

Week 8: SWAPS

Watch the following online lectures prior to class:

- a. SWAPS
- b. Institutional Investors

Complete online quiz prior to class.

Required Reading: "Fixed Income Arbitrage in a Financial Crisis (C): TED Spread and Swap Spread in November 2008 (3<sup>rd</sup> Harvard Business Case) Homework 9 due by the end of class.

Week 9: Risk Aversion, Utility Functions, and Portfolio Theory Watch the following online lectures prior to class:

- a. Returns, Risk, and Risk Aversion
- b. Correlation and Risk Reduction
- c. Portfolio Theory

Required Reading for Discussion: Turn on a Paradigm?

Complete online quizzes prior to class.  
In-class lecture involves calculations. Bring a calculator.

#### Week 10: Guest Speaker

Week 11: The Capital Asset Pricing Model Watch online lectures prior to class:

- a. The CAPM
- b. Reality and the CAPM

Complete online quiz prior to class.  
In-class lecture involves use of Excel. Bring a Laptop if you have one.  
Homework 10 due by the end of class.

#### Week 12: Multifactor Models

Watch the following online lectures prior to class:

- a. Multifactor Models

Complete online quiz prior to class.  
In-class lecture involves the use of Excel and numerous calculations. Bring a calculator and a Laptop if you have one.

Required Reading: “Research Affiliates: Fundamental Indexing” (4<sup>th</sup> Harvard Business Case)  
Homework 11 due by the end of class.

#### Week 13: Performance Evaluation

Watch the following online lectures prior to class:

- a. Performance Evaluation
- b. Performance Evaluation in Excel Complete online quiz prior to class.

In-class lecture involves the use of Excel and numerous calculations. Bring a calculator and a Laptop if you have one.

Required Reading for Discussion: Factor Investing  
Homework 12 due by the end of class.

#### Week 14: Exam

Covers material from () to () Exam lasts 180 minutes.

Remember to bring a calculator and a pencil.

## 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](http://ods.rutgers.edu).

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

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

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

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

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