

Financial Analysis
Course Number: 22:430:611
Course Title: Analysis of Fixed Income

COURSE DESCRIPTION

The course is intended to give students an in-depth treatment of fixed income analytics. A solid understanding of the bond pricing and yield curve material from the Investments course is necessary. There are three sections to the semester.

- a. The first part of the course will cover bond valuation and various measures of bond risk. We will study: bootstrapping and the creation of a theoretical spot curve; valuing bonds with embedded options; many kinds of duration; and convexity.
- b. The second part of the course will cover the securitization process. We will study the general securitization process and the specific attributes of various mortgage-backed securities. We will use Monte Carlo simulations to value asset-backed securities.
- c. The third part of the course will deal with measures of portfolio risk and how factors such as spread risk and convexity affect the value of a bond portfolio when interest rates change. We will also look at return and risk attribution for the individual bonds in a portfolio that I will supply.

COURSE MATERIALS

We will use a customized edition of *Bond Markets, Analysis, and Strategies*, 9th edition by Frank Fabozzi. The publisher is Pearson. Barnes & Noble has it.

LEARNING GOALS AND OBJECTIVES

For All Finance & Economic Department Classes:

- a.) Successful students will demonstrate an understanding of corporate finance and solve corporate finance problems related to the time value of money, basic capital budgeting, and the financing decision of the firm.
- b.) Successful students will demonstrate their ability to analyze investments in financial instruments and apply the basics of portfolio theory.
- c.) Successful students will demonstrate their knowledge of and the ability to analyze the characteristics of global financial markets and institutions.

For the Fixed Income Class:

- a.) To understand the characteristics and risks of non-callable bonds, callable bonds, corporate bonds, convertible bonds, tax-exempt bonds, inflation indexed bonds, floating rate securities, and mortgage-backed and asset-backed securities.
- b.) To understand the importance of duration as a measure of risk. We will study Macaulay duration, modified duration, effective duration, dollar duration, spread duration, portfolio duration, and key rate duration.
- c.) To understand how movements in the yield curve affect bond valuation and price volatility. We will study parallel shifts, non-parallel shifts, and butterfly shifts in the yield curve. We will also study bootstrapping and the construction of the theoretical spot curve for the Treasury market.
- d.) To understand convexity, both positive and negative. How convexity changes between callable and non-callable bonds. How convexity and duration are related for callable and non-callable bonds. Students will also study the convexity adjustment to the duration pricing formula.
- e.) To understand the valuation of bonds with embedded options. Callable and puttable bonds. Calculate an option-adjusted spread using the binomial method.
- f.) To understand the securitization process for home mortgages and other credit assets, such as auto loans, credit card receivables, and student loans. We will study the structures of pass-throughs, agency and non-agency CMOs, IOs, POs, and PAC bonds.
- g.) To master the key concepts of applied risk management. Tracking error. Multi-factor risk models. Portfolio duration. Performance attribution analysis. Managing a portfolio to a benchmark bond index.
- h.) To provide preparation for those students who are studying for the CFA Level 1 exam.

PREREQUISITES

The prerequisite is Investment Management & Analysis 390:603.

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.

COURSE REQUIREMENTS.

Student evaluations will be based on two mid-term exams, problem sets, and a project, which will serve as the final exam. Problems will be assigned for most chapters, and some Bloomberg assignments might be required also. All assignments will be submitted via Canvas.

Some problem sets will use Excel spreadsheets that I developed. These spreadsheets cover accrued interest, risk and return attribution, comparing bullet and barbell portfolios, tracking error, the information ratio, and managing a bond portfolio.

ATTENDANCE AND PREPARATION POLICY

University policy is that attendance is required. I do not take attendance. If you know you will be absent for a university approved activity, such as you are a member of a sports team, or you are ill, have a family emergency, or an interview, please send a message.

CLASSROOM CONDUCT

No computers, tablets, cell phones, or devices of any kind can be used in class.

Occasional lateness is ok. Busses are late, cars breakdown, and traffic is unpredictable. But, chronic tardiness, frequently being 15-20 minutes late, is disruptive and disrespectful to me and the class. Don't make a habit of being late.

EXAM DATES AND POLICIES

The exam dates are approximate and are listed in the Course Schedule section.

If you have a disability that influences testing procedures, please provide me an official letter from the Office Disability Service at the start of the semester.

You cannot use a phone to make calculations during an exam. You must use a non-programmable calculator.

No formula sheets will be allowed for the exams.

I will give you credit in Canvas when you submit a completed problem set. Please check to make sure I give you credit for every assignment you do. It is always possible that I make a mistake and fail to give you proper credit for the assignments you turn in. **Protecting your interest is your responsibility. No late assignments will be accepted. Any disputes about homework assignments must be communicated to me in an email by the date of our last class. Otherwise, the Canvas total stands as your submitted homework for the semester.**

GRADING POLICY

The weights for the course requirements are:

Exam 1: 30%.
Exam 2: 40%.
Project: 25.0%
Homework: 5.0%.

The grading scale:

A: 91 – 100.
B+: 86 – 90.
B: 81 – 85.
C+: 75 – 80.
C: 70 – 74.
D: 60 – 69.

This is the formal grading scale, but generally all grades are scaled up once final semester averages have been determined.

COURSE SCHEDULE

Week 1:

Overview of course.

Chapter 1: Pricing of Bonds.

- a.) Review of bond price mechanics.
- b.) Review some of the rules for bond pricing.
- c.) Premium & discount bonds as maturity approaches.
- d.) Pricing of bonds when next coupon is due in less than 6 months.

Week 2:

Chapter 2: Measuring Yield.

- a.) Current Yield.
- b.) Yield to Maturity and reinvestment risk.
- c.) Yield to Call.
- d.) Yield to Put.
- e.) Yield to Worst.
- f.) Computing the Total Return.

Week 3:

Chapter 3: Bond Price Volatility.

- a.) Handout on the “Rules for Bond Pricing.”

- b.) Price Value of a Basis Point (DV01).
- c.) Macaulay Duration and Modified Duration.
- d.) Dollar Duration, Spread Duration, Portfolio Duration, and Key Rate Duration.
- e.) Convexity: Positive and Negative.
- f.) The importance of yield volatility.

Week 4:

Chapter 4: Factors Affecting Bond Yields and the Term Structure of Interest Rates.

- a.) Why the yield curve should not be used to price a bond.
- b.) The Theoretical Spot Curve.
- c.) Forward interest rates.
- d.) A few comments on the Swap Rate Yield Curve.

Week 5:

Chapter 5: Treasury and Federal Agency Securities.

- a.) Accrued interest.
- b.) TIPS and the Breakeven Rate of Inflation.

Week 6:

Exam 1: Chapters 1, 2, 3, 4, and 5.

Week 7:

Chapter 8: Agency Mortgage Pass-Through Securities.

- a.) Mortgage pass-through securities.
- b.) Mortgage Prepayments: Single Monthly Mortality & Conditional Prepayment Rate.
- c.) PSA Prepayment Model.
- d.) Cash-Flow Yield.
- e.) Prepayment Risk.

Week 8:

Chapter 9: Agency CMOs and Stripped MBS.

- a.) Plain Vanilla Sequential Pay CMOs.
- b.) With an accrual tranche (Z-tranche).
- c.) With floating-rate and inverse floating-rate tranches.
- d.) Planned Amortization Class bonds (PAC).
- e.) Stripped MBS.
- f.) Non-agency CMOs.

Week 9:

NO CLASS

Week 10:

Chapter 10: Nonagency Residential MBS.

- a.) Credit enhancements: Structural, Originator/Seller Provided, and Third-Party Provided.
- b.) Nonagency MBS: Cash Flow and Delinquency Measures.

Chapter 11: Asset-Backed Securities.

- a.) The Securitization Process.

Week 11:

Chapter 12: Analysis of Bonds with Embedded Options.

- a.) Static Spread.
- b.) Callable Bonds: Negative Convexity.
- c.) Valuing Callable Bonds: Binomial Interest Rate Tree.
- d.) Option-Adjusted Spread.
- e.) Effective Duration and Convexity.

Week 12:

Chapter 14: Measuring Credit Spread Exposures of Corporate Bonds.

- a.) Spread Duration.
- b.) Duration Times Spread.
- c.) Duration of High-Yield Bonds.

Week 13:

Chapter 15: Bond Portfolio Management Strategies.

- a.) Portfolio Management Strategies.
- b.) Yield Curve Shifts: Parallel, Twist, and Humpedness.
- c.) The Use of Leverage.
- d.) Duration of a Leveraged Portfolio.

Chapter 16: Bond Portfolio Construction.

- a.) Tracking error.
- a.) Risk Decomposition.
- b.) Portfolio Rebalancing.

Week 14:

Chapter 18: Liability-Driven Investing for Defined Benefit Pension Plans.

- a.) Single-Period Immunization.
- b.) Immunization Risk.
- c.) Multi-Period Immunization.
- d.) Cash Flow Matching.

Week 15:

Exam 2: Selected material from Chapters 8, 9, 10, 11, 12, 14, 15, 16, and 18.

Course Fixed Income Projects are due

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.]