

**MGT 805: Fixed Income Securities – Bonds, Swaps, and Derivatives****Instructor**Saman Majd ([saman.majd@yale.edu](mailto:saman.majd@yale.edu))*Office hours by appointment***Teaching Assistant**Heather Masciotti ([heather.masciotti@yale.edu](mailto:heather.masciotti@yale.edu))*Review sessions and office hours to be determined***Course Description**

Fixed income markets are among the largest in the world and fixed income products are a key component of any investment strategy. This course covers the valuation and risk management of the key fixed income products – bonds, futures, forwards, swaps, options, and structured products. It combines theory with practical examples and exercises demonstrating the complications that arise when applying theory to realistic situations.

**Course Requirements**

Course requirements include regular attendance and class participation in lectures, weekly homework assignments, two in-class midterm exams, and a final exam during the end-of-semester exam period. All exams are open-book and open-notes, and you may use any spreadsheets or materials from the class. **The approximate breakdown of the grades is: homework = 15%, midterm 1 = 20%, midterm 2 = 20%, final exam = 45%.**

**Topic Outline**

Default-free bonds: the US Treasury bond market  
Bond pricing fundamentals: spot rates, forward rates, yield curves  
Interest rate risk: duration and convexity  
Futures and forwards  
Interest rate swaps  
Swap spreads and financial crises  
Foreign exchange and interest rates  
Option pricing fundamentals  
Options on bonds  
Options on interest rates: caps, floors, swap options  
Securitization: asset backed securities and mortgage-backed securities  
Credit markets and credit derivatives

**Textbooks and Lecture Slides**

The following texts are required:

- *Fixed Income Markets and Their Derivatives*, Suresh Sundaresan, Academic Press, 3<sup>rd</sup> edition, 2009. ISBN: 9780123704719 (eBook ISBN: 9780080919331)
- *Options, Futures and other Derivatives*, John Hull, Pearson, 10<sup>th</sup> edition, 2018. ISBN: 9780134472089 (eBook ISBN: 9780134631493)

The following text is for optional background reading and will be on reserve in the library:

- *The Trader's Guide to Key Economic Indicators*, Richard Yamarone, Bloomberg Press, 3<sup>rd</sup> edition, 2012. ISBN: 9781118074008

Lecture slides will be available for download from the class website after each lecture.

**Background Reading**

- Yamarone: p.1-8, 11-23, 30-38

Economic events can have a major impact on interest rates. Yamarone provides a good summary of the key economic indicators that affect markets.

**Lecture Schedule**

The following schedule is approximate and will be adjusted according to the pace at which we cover the material. Please check the course site on Canvas regularly for updates.

Lectures 1-9

Introduction  
US Treasury bond market  
Review basic bond analytics  
Spot rates, forward rates, the yield curve  
Explaining the term structure of interest rates  
Interest rate risk – DV01, duration, and convexity  
Money market rates & the Federal Reserve  
Repo and reverse repo  
“Yield Curve Exercise” – review and discussion  
On-the-run versus off-the-run Treasury bonds  
Libor and Libor floating rate note  
Forward rate agreements  
Eurodollar futures  
Futures versus forwards  
Swap basics, swaps versus Treasuries  
Counterparty risk and mark-to-market agreements  
Swap portfolios (Lehman example)  
Swap spreads and financial crises  
“Trade of the century”?

**In-class midterm exam #1 will be approximately here**

Lectures 10-16

Inflation adjusted bonds  
Foreign exchange, FX forwards and interest rates  
Currency swaps  
Basics of option pricing  
Black-Scholes-Merton methodology  
Dynamic replication and binomial model  
Black-Scholes formula  
Option risk management – the “greeks”  
Options on interest rates: caps, floors, swap options  
“Options Exercise” – review and discussion  
Volatility skew and smile  
Volatility markets and volatility trades

**In-class midterm exam #2 will be approximately here**

Lectures 17-24

Value at Risk  
Risk management case studies (Metallgesellschaft, Orange County, P & G, Allied-Lyons, Showa Shell)  
[Guest speaker \(tbd\)](#)  
Securitization  
Mortgage-backed securities  
Credit spreads and default risk  
Credit derivatives  
[Guest speaker \(tbd\)](#)  
Final class – wrap up and discussion

**Final exam will be scheduled during the final exam period**

**Textbook References**

<i>Topics</i>	<i>Sundaresan readings</i>	<i>Hull readings</i>
Introduction US Treasury bond market Review basic bond math Spot rates, forward rates, the yield curve	Ch.1 (p.3-23) 2-2.2 (p.25-33) 8-8.1.0 (p.131-134) 8.1.4 (p.138-139) 8.2-8.4 (p.143-157)	4-4.9 (p.77-94) 6.1 (p.135-137)
Explaining the term structure of interest rates Interest rate risk – DV01, duration, and convexity Money market rates & the Federal Reserve Repo and reverse repo	7-7.2.3 (p.105-117) 7.4 (p.119-125) 3-3.3 (p.45-53) 5-5.6 (p.67-84)	4.10-4.11 (p.94-99) 4.12 (p.99-101)
Libor and Libor floating rate note Forward rate agreements Eurodollar futures Futures versus forwards Swap basics, swaps versus Treasuries Swap spreads and financial crises	15-15.2 (p.303-311) 16-16.3 (p.325-345) 16.4-16.5 (p.345-348)	6.3-6.5 (p.143-150) 5.10 (p.120-123) 7-7.4 (p.155-165)
Inflation adjusted bonds (TIPS) Foreign exchange, FX forwards and interest rates Currency swaps	13.1-13.3 (p.269-278)	7.7-7.8 (p.169-174)
Basics of option pricing Black-Scholes-Merton methodology Dynamic replication and binomial model		10-10.2 (p.209-213)
Black-Scholes formula Black Model Option risk management – the “greeks”		15.4 (p.323-327) 15.8-15.9 (p.333-337) 18.7-18.8 (p.388-390) 19.4-19.11 (p.401-418)
Options on interest rates: caps, floors, swap options	15.5-15.6 (p.316-324) 16.6-16.7 (p.348-352)	29.2 (p.675-678) 29.3 (p.681-683)
Volatility skew and smile Volatility markets and volatility trades	8.1.2-8.1.3 (p.136-138)	15.11 (p.339-340) 20.4-20.5 (p.437-438) <i>Optional: 26.16 (p.611-614)</i>
Value at Risk		22.1 (p.493-495)
Securitization and mortgage-backed securities	12-12.4 (p.245-262)	8 (p.184-196)
Credit spreads and default risk Credit derivatives	10-10.3 (p.197-210) 10.5 (p.217-220) 18-18.5 (p.377-386) 19-19.5 (p.397-407)	24-24.3 (p.543-546) 25-25.1 (p.569-573) 25.3 (p.577) 25.7-25.8 (p.579-580)