《固定收益证券》教学大纲

**“Fixed Income Securities” Syllabus**

课程编号：150003A

课程类型：专业必修课

总 学 时：48 讲课学时：48 实验（上机）学时：0

学　　分：3

适用对象：金融学（数据与计量分析）

先修课程：无

Course code: 150003A

Course Type: Compulsory course

Credit hours: 48 Lectures: 48 Practice: 0

Credits: 3

Major: Finance

Prerequisite: None

1. **课程的教学目标（Learning objective）**

固定收益证券是金融类专业本科生的专业课。其在行业内的重要性体现在以下三点：第一，目前是全球交易的金融资产中固定收益证券比重最大。其次，机构投资者，比如银行、养老基金或是共同基金所设计的投资组合中固定收益证券和利率的衍生工具占比最大。最后，理解利率的变化并对其建模是实行好的风险管理的重要前提。该课程的教学对培养与训练学生金融学思维方式，提高其综合素质和能力有非常重要的意义。本课程教学的主要目标是培养学生掌握固定收益类证券的基本理论知识，使学生能够将所学知识应用到将来所从事的金融证券行业的工作中去，或为本科以后阶段的学习打下坚实的理论基础。除此之外，本课程还将课程思政内容贯穿其中，增强学生的契约精神与社会责任感，为社会主义特色的金融市场培养人才。

Fixed income securities is a field course in Finance major. The course is an important course for three reasons. First, fixed income securities constitute by far the largest portion of globally traded assets. Institutional investors, such as banks, pension funds or mutual funds, have most of its trading portfolio composed of fixed income securities (treasury bills and bonds) and interest rate derivatives. Second, in developed financial markets, a significant part of capital for business is raised through issuing of corporate bonds. Last, but not least, proper understanding of changes in the interest rates and the ability to model them is a prerequisite for a good risk management. The instruction of fixed income securities plays very important role in building up students’ thinking as a practitioner in finance industry for the learners, and improving their comprehensive abilities to work and study. The aim of this course is to help student understand the basic theories and knowledge of fixed income securities, and apply the knowledge in this course to their future work in finance industry; or be well prepared for their future study in this field.

1. **教学基本要求（Teaching requirements）**

（一）教学内容 (teaching materials)

这门课主要覆盖了以下十部分内容：(1)固定收益证券的概念、债券的种类。(2)债券发行市场、流通市场、债券交易、债券评级。(3)货币的时间价值、债券价值、复杂情况下债券价值等的计算。(4)债券收益率。(5)凸性和久期的概念，票面利率大小、到期时间、初始收益率与债券价格波动的关系。(6)名义利率决定理论、利率期限结构理论。(7)利率期货、利率期权、利率掉期。(8)利率衍生工具的定价。(9)可转换债券定价与收益分析。(10)债券投资组合管理策略。

The course covers (1) the concept of fixed-income securities, types of bond. (2) bond issue market, secondary market, bond trading, bond rating. (3) the time value of money, bonds’ value, the calculation of bond value under complex conditions. (4) bonds yields. (5) concept of convexity and duration, relationship of the coupon rate, maturity time, initial yield to bond price volatility. (6) the theory on nominal interest rate decision, on the interest rate term structure. (7) interest rate futures, interest rate options, interest rate swaps. (8) pricing of interest rate derivatives. (9) the analysis of convertible bond’s pricing and yield. (10) Bond portfolio management strategies.

（二）教学方法和手段

这门课理论性较强，以理论教授为主，学生练习为辅。同时安排“读、写、议”课堂以便学生能够深入理解基本原理；组织学生分组进行主题课堂讨论。

The course is mainly theoretical. The main teaching technique will be lecturing companied by students’ tutorial presentation. The class will involve reading, writing and discussion to help students fully understand the course materials. In-class group presentation will also be important parts of the course.

（三）考核方式 (Assessment and Grading)

该科满分一百，由以下各部分按不同权重组成。

The total score is 100，the weight of different parts is as followed.

|  |  |
| --- | --- |
| **类别 (Components)** | **权重 (Weight)** |
| **平时成绩 (Coursework)** | **30%** |
| 1. 随堂小测验 (In-Class Quiz) | 15% |
| 2. 课堂讲演 (Tutorial Presentation) | 15% |
| **闭卷期末考试 (Final Exam)** | **70%** |
| **总共 (Total)** | **100%** |

1. **各教学环节学时分配（Course schedule）**

**教学课时分配 Class schedule**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 章节内容  Contents | 讲课  Lecture (hours) | 实验  Practice  (hours) | 其他  Other  (hours) | 合计  Total  (hours) |
| 货币的时间价值  Time Value of Money | 2 | 1 |  | 3 |
| 固定收益证券及其市场概述  Introduction to Fixed Income Securities and Markets | 2 | 1 |  | 3 |
| 债券定价及收益率  Bond Price and Yield | 2 | 1 |  | 3 |
| 债券价格波动及其衡量指标  Bond Price Volatility | 2 | 1 |  | 3 |
| 利率的期限结构  Term Structure of Interest Rate | 4 | 2 |  | 6 |
| 利率模型（期限结构模型）  Interest-rate model (term structure model) | 2 | 1 |  | 3 |
| 嵌入期权式债券分析  Analysis of Bonds with Embedded Options | 4 | 2 |  | 6 |
| 住房抵押贷款证券  Residential Mortgage-Backed Securities | 2 | 1 |  | 3 |
| 抵押担保债券  Collateralized Mortgage Obligations | 2 | 1 |  | 3 |
| 利率期货  Interest Rate Futures | 2 | 1 |  | 3 |
| 利率期权  Interest Rate Options | 2 | 1 |  | 3 |
| 利率掉期和信用违约掉期  Interest Rate Swaps and Credit Default Swaps | 3 | 1.5 |  | 4.5 |
| 债券投资组合策略  Bond Portfolio Strategies | 3 | 1.5 |  | 4.5 |
| 合计  Total | 32 | 16 |  | 48 |

1. **教学内容（Teaching materials）**

**第一章 货币的时间价值**

1. 市场利率的决定因素
2. 利率的类型
3. 现值和终值
4. 年金和永续年金
5. 非等额现金流

**重点、难点**：市场利率，现值和终值，金融计算器，本节课插入课程思政内容，分析高利率背后的风险和骗局。

**考核要求**：掌握市场利率的决定因素；掌握现金流、现值和终值的关系；掌握金融计算器的使用方法

**Lecture 1 Time Value of Money**

1. The Determinants of Market Interest Rates
2. Classification of Interest Rates
3. Present Values and Future Values
4. Annuities and Perpetuities
5. Uneven Cash Flows

**Key Points**: market interest rates, cash flows, present values and future values, financial calculator

**Outcome**: grasp the determinants of interest rates; grasp the relation among present value, future value and cash flows; understand how to use a financial calculator

**第二章 固定收益证券及其市场概述**

1. 债券特点概述
2. 美国国债和国库券
3. 美国州政府债
4. 公司债

**重点、难点**：债券特点，发行人类别，嵌入期权式债券，债券投资风险。本课程插入课程思政内容，分析债券违约的后果。

**考核要求**：理解债券市场的主要构成部分；理解债券的主要种类及各自的特点

**Lecture 2 Introduction to Fixed Income Securities and Markets**

1. Overview of Bond Features
2. U.S. Treasury and Federal Agency Securities
3. U.S. Municipal Securities
4. Corporate Debt Instruments

**Key Points**: features of bonds, types of issuers, bonds with an embedded option, types of risks faced by investors in fixed-income securities

**Outcome**: understand the components of fixed income securities markets; understand types of bonds and their features

**第三章 债券定价及收益率**

1. 债券定价
2. 价格收益率关系
3. 到期收益率
4. 年化收益率和有效收益率
5. 债券的回报
6. 非债券付息日的债券定价

**重点、难点**：债券定价，到期收益率，应计利息，标价

**考核要求**：掌握债券定价；掌握到期收益率的计算；理解价格收益率曲线；理解应计利息和标价

**Lecture 3 Bond Price and Yield**

1. Pricing a Bond
2. Price-Yield Relationship
3. Yield to Maturity
4. Annualized and Effective Yields
5. Total Return of a Bond
6. Pricing a Bond between Coupons Payment Dates

**Key Points**: pricing a bond, yield to maturity, accrued interest, quoted price

**Outcome**: grasp the calculation of the price of a bond; grasp the calculation of yield to maturity; understand the price-yield relationship; understand the concept of accrued interest and quoted price

**第四章 债券价格波动及其衡量指标**

1. 债券价格波动的特点
2. 久期
3. 凸度
4. 用久期和凸度估计债券价格的变动

**重点、难点**：债券价格波动，久期，凸度，有效久期和凸度，价格变化估计

**考核要求**：理解债券价格波动；掌握久期，凸度的计算；掌握用久期和凸度估计债券价格变动的方法

**Lecture 4 Bond Price Volatility**

1. Price Volatility Characteristics of Option-Free Bonds
2. Duration
3. Convexity
4. Approximating price change using Duration and Convexity

**Key Points**: price volatility, duration, convexity, effective measures, approximating bond price change

**Outcome**: understand what is price volatility; grasp the calculation of duration and convexity; grasp the approximation of bond price using duration and convexity

**第五章 利率的期限结构I**

1. 基础利率和基准利差
2. 即期利率
3. 构造即期利率曲线

**重点、难点**：基础利率，利差，即期利率，自助法

**考核要求**：理解基础利率，利差以及它们与其他利率的关系；理解即期利率；掌握构造即期利率曲线的方法

**Lecture 5 Term Structure of Interest Rate I**

1. Base Interest Rate and Benchmark Spread
2. Spot Rate
3. Constructing the Theoretical Spot Rate Curve

**Key Points**: base interest rate, spread, spot rate, bootstrap

**Outcome**: understand base interest rate, spread and their relation with other interest rate; understand spot rate; grasp the construction of the theoretical spot rate curve

**第六章 利率的期限结构II**

1. 利用即期利率给债券定价
2. 远期利率
3. 利率期限结构的决定因素

**重点、难点**：远期利率，掉期利率，LIBOR利率

**考核要求**：掌握利用即期利率或远期利率给债券定价的方法；理解利率期限结构的决定因素及曲线的形状；理解掉期利率和LIBOR利率的概念

**Lecture 6 Term Structure of Interest Rate II**

1. Using Spot Rate Curve to Price a bond
2. Forward Rate
3. Determinants of Term Structure
4. the swap curve/LIBOR curve

**Key Points**: forward rate, swap rate, LIBOR rate

**Outcome**: grasp the pricing of bond using spot rate or forward rate; understand the determinants and shape of term structure; understand the concept of swap rate and LIBOR rate

**第七章 利率模型（期限结构模型）**

1. 利率模型的特点：漂移，波动和均值回归
2. 单因子利率模型
3. 无套利模型和均衡模型
4. 利率变化的经验证据

**重点、难点**：利率二叉树，利率模型，漂移，波动，均值回归，单因子，无套利，均衡

**考核要求**：了解利率模型的基础知识；理解无套利模型和均衡模型的关系；了解利率变化的经验研究证据

**Lecture 7 Interest-rate model (term structure model)**

1. Characteristics of an interest-rate model: drift, volatility, and mean reversion
2. One-factor interest-rate models
3. Arbitrage-free model and equilibrium model
4. The empirical evidence on interest rate changes

**Key Points**: binominal interest rate trees, interest-rate model, drift, volatility, mean reversion, one-factor, arbitrage, equilibrium

**Outcome**: understand the basis of interest-rate models; understand the relation between arbitrage-free model and equilibrium model; understand the empirical evidence on interest rate models

**第八章 嵌入期权式债券分析I**

1. 期权的特点
2. 可召回债券的特点
3. 嵌入期权式债券的定价

**重点、难点**：嵌入式期权，可召回，可卖出，可转，期权定价

**考核要求**：了解嵌入期权式债券和普通债券的区别；理解期权式债券的主要类别；掌握嵌入期权式债券的定价

**Lecture 8 Analysis of Bonds with Embedded Options I**

1. Characteristic of Options
2. Features of Callable Bonds
3. Pricing of A Bond with Embedded Options

**Key Points**: embedded options, callable, putable, convertible, option pricing

**Outcome**: understand the difference between bonds with embedded options and option-free bonds; understand the typical bonds with embedded options; grasp the pricing of a bond with embedded options

**第九章 嵌入期权式债券分析II**

1. 期权调整利差
2. 有效久期和凸度
3. 可转债

**重点、难点**：期权调整利差，可转债。本节插入课程思政内容，分析可转债炒作的风险与危害。

**考核要求**：了解期权调整利差的概念；掌握可转债和股票的关系

**Lecture 9 Analysis of Bonds with Embedded Options II**

1. Option-Adjusted Spread
2. Effective Duration and Convexity
3. Features of Convertible Bonds

**Key Points**: option-adjusted spread, convertible bonds

**Outcome**: understand the concept of option-adjusted spread; grasp the relation between convertible bonds and stocks

**第十章 住房抵押贷款证券**

1. 住房抵押贷款
2. 住房抵押贷款支持证券市场
3. 抵押转递证券

**重点、难点**：住房抵押贷款，住房抵押贷款支持证券。本节插入课程思政内容，分析2008年美国金融危机的发生原因、危害以及背后出现的违法违规行为。

**考核要求**：理解住房抵押贷款及其种类；理解按揭的概念及住房抵押贷款的风险；理解住房抵押贷款支持证券和抵押转递证券的概念

**Lecture 10 Residential Mortgage-Backed Securities**

1. Residential Mortgage Loans
2. Residential Mortgage-Backed Securities Markets
3. Characteristics of Mortgage Pass-Through Securities

**Key points**: residential mortgage loans; mortgage-backed securities

**Outcome**: understand a mortgage loan and types of residential mortgage loans; understand a prepayment and risks associated with investing in mortgages; understand the concepts of a mortgage-backed security and a mortgage pass-through security

**第十一章 抵押担保债券**

1. 抵押担保债券
2. 信贷资产证券的产生
3. 担保类型及证券化结构
4. 担保债务凭证

**重点、难点**：抵押担保债券，信贷资产证券，担保债务凭证。本节插入课程思政内容，分析高利贷、套路贷等的危害。

**考核要求**：了解抵押担保债券的来由；理解序列型抵押担保债券的概念；理解信贷资产证券是如何产生的；了解证券化的基本结构；了解担保债务凭证的概念及其种类

**Lecture 11 Collateralized Mortgage Obligations**

1. Characteristics of Collateralized Mortgage Obligations
2. Creation of an ABS
3. Collateral Type and Securitization Structure
4. Collateralized Debt Obligations

**Key Points**: collateralized mortgage obligation; asset-backed securities; collateralized debt obligation

**Outcome**: understand why and how an agency collateralized mortgage obligation is created; understand what a sequential-pay CMO is; understand how asset-backed securities are created; understand the basic structure of a securitization; understand what is meant by a collateralized debt obligation, collateralized bond obligation, and collateralized loan obligation

**第十二章 利率期货**

1. 利率期货
2. 利率期货市场的定价和套利
3. 利率期货在债券投资组合管理里的应用

**重点、难点**：期货，最低交割价，利率期货合约价格

**考核要求**：理解期货合约及其与远期合约的不同；理解利率期货的基本特点；理解利率期货合约的理论定价；理解利率期货在债券投资组合管理里的应用

**Lecture 12 Interest Rate Futures**

1. Interest Rate Futures Contracts
2. Pricing and Arbitrage in the Interest Rate Futures Market
3. Bond Portfolio Management Application

**Key Points**: futures; cheapest-to-deliver; price of a futures contract

**Outcome**: understand what a futures contract is and the differences between a futures contract and a forward contract; understand the basic features of various interest-rate futures contracts; understand how the theoretical price of a futures contract is determined; understand how futures contracts can be used in bond portfolio management

**第十三章 利率期权**

1. 利率期权
2. 期权的内在价值及其时间价值
3. 期权定价及套利
4. 影响期权价格波动的因素
5. 对冲策略

**重点、难点**：利率期权，内在价值, Black–Scholes期权定价模型；无套利二叉树模型；对冲。本节插入课程思政内容，分析杠杆在衍生品交易中的作用与风险，提高学生对于高杠杆的警惕。

**考核要求**：理解利率期权合约的基本特点；理解期权和期货的不同；理解利率期权的理论定价；理解如何衡量期权价格的敏感性；了解期货期权在对冲里的应用

**Lecture 13 Interest Rate Options**

1. Types of Interest Rate Options
2. Intrinsic Value and Time Value of an Option
3. Option Pricing and Arbitrage
4. Sensitivity of Option Price to Change in Factors
5. Hedging Strategies

**Key Points**: interest-rate options contracts; intrinsic value; Black–Scholes option pricing model; arbitrage-free binomial model; hedging

**Outcome**: understand the basic features of interest-rate options contracts; understand the differences between options and futures; understand how to value options on fixed-income securities; understand measures to estimate the sensitivity of the option price; understand how futures options can be used to hedge

**第十四章 利率掉期和信用违约掉期**

1. 掉期交易
2. 掉期利率
3. 掉期定价
4. 信贷违约掉期的种类
5. 利用信贷违约掉期控制信用风险

**重点、难点**：利率掉期，掉期期权，信贷违约掉期

**考核要求**：理解利率掉期的概念以及掉期利率的计算；了解信贷衍生工具与利率衍生工具的不同；了解信贷违约掉期；了解如何利用信贷违约掉期控制一个投资组合的信用风险

**Lecture 14 Interest Rate Swaps and Credit Default Swaps**

1. Interpreting a Swap Position
2. Calculation of a Swap Rate
3. Valuing a Swap
4. Types of CDS
5. Using CDS to Control for Credit Risk

**Key points**: interest-rate swaps; swaption; credit default swap

**Outcome**: understand what an interest-rate swap is and how the swap rate is calculated; understand how a credit derivative differs from an interest-rate derivative; understand what a credit default swap is and how a credit event can be defined; understand how a credit default swap can be used to control a portfolio’s credit risk

**第十五章 债券投资组合策略**

1. 资产分配决策
2. “自上而下”与“自下而上”的投资组合构建
3. 主动型投资组合管理策略
4. 债务驱动型投资组合管理策略

**重点、难点**：资产分配，自上而下，自下而上，子弹型，杠铃型，阶梯型收益曲线，杠杆，债务驱动，免疫

**考核要求**：理解“自上而下”与“自下而上”两种不同的债券投资组合构建；了解主动性债券投资组合管理策略的主要类型；了解债务驱动的投资组合管理的概念；了解免疫策略的基本原理

**Lecture 15 Bond Portfolio Strategies**

1. Asset Allocation Decision
2. Top-Down vs. Bottom-Up Portfolio Construction
3. Active Portfolio Management Strategies
4. Liability-Driven Strategy

**Key points**: asset allocation, top-down, bottom-up, bullet, barbell, ladder yield curve, leveraging, liability-driven, immunization

**Outcome**: understand top-down and bottom-up approaches to bond portfolio management; understand the different types of active bond portfolio strategies; understand what a liability-driven strategy is; understand the basic principles of an immunization strategy

**五、其它**

无

**六、主要参考书**

[1] Fabozzi, Frank J. *Bond Markets, Analysis, and Strategies (8th ed.)*. Pearson. 2013

[2] Fabozzi, Frank J., *Fixed Income Analysis (2nded.)*. McGraw-HillCompanies, Inc.2007

[3] Tuckman, Bruce and Angel Serrat, Fixed Income Securities: Tools for Today's Markets (3rded.). Hoboken, NJ: John Wiley&Sons, Inc. 2012

[4] Veronesi,Pietro, *Fixed Income Securities: Valuation, Risk, and Risk Management.* Hoboken, NJ: John Wiley&Sons, Inc. 2010

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