**FINANCIAL ECONOMICS PHD**

**Acadmic Staff**

**Full Time**

Prof. Dr. Gazanfer Ünal

Prof. Dr. Veysel Ulusoy

Assist. Prof. Dr. Sema Dube

Assist. Prof. Dr. Akın Şeber

Assist. Prof. Dr. Şükriye Tüysüz

**Part Time**

Assoc. Prof. Dr.. İlyas Akhisar

**Research Assistants**

Selçuk Bayracı (Msc)

Oğuz Ersan (Msc)

**Program Information**

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| --- |
| **Foundation:** PhD program in Financial Economics program was founded in 2007, and produces graduates since 2011.**Objective:**Financial Economics Doctorate Program analyses the structure of financial instruments and tools in the markets; works with the creation and development of these; aims to observe the price movements in inter(national) financial markets and risk return levels by the use of existing models.Being focused on Financial Engineering, the program captures topics such as asset and derivative pricing, risk management and protection, portfolio analysis, financial calculus and econometrics. PhD program is designed to maintain a solid educational and research background in teoretical and empirical finance. Apart from the quantitative finance methods, it is aimed that, economics and finance theory are covered through the program |
| **Target:** Graduates of the financial eocnomics PhD program are expected to be preferred by highly reputable domestic and international Universities and large financial institutions and corporations by their capability in the field. |

**Degree:**

This program belongs to eight level with 240 ECTS in the higher education system in the fields of Economics

Successful candiates are awarded with the degree of PhD in the fields of Financial Economis

**Acceptance Criteria:**

Candidates must have a bachelor degree from an approved instituion, 55 or over from academic higher education exam ALES ( Candidates without a master degree are required to have minimum 70 or over), and have an English language exam result obtained in the last two years. Accepted exams are: ÜDS or KPDS 70, TOEFL 79, IELTS 6.5. Candidates without an exam result should pass the Yeditepe University English exam.

**Career opportunities:**

Apart from academic career opportunities, there are several career opportunities for the graduates of the Financial Economics program in the financial markets and institutions such as; commercial and investment banks, insurance and investment companies, audit companies, financial software and technology companies, government instituions and treasury and finance departments of non-financial institutions and companies.

**Graduation requirements:**

Candidates should complete 9 taught courses + 2 research courses + PhD qualification exam + PhD thesis and thesis exam in order to graduate.

**Curriculum**

**I. Semester**

|  |  |  |  |
| --- | --- | --- | --- |
| **CODE** | **COURSES** | **CREDIT** | **ECTS** |
| FE500 OR FE507 | Fundamentals of Finance OR Principles of Financial Engineering | 3 | 10 |
| FE501 | Financial Calculus | 3 | 10 |
| FE502AKTS | Financial Econometrics | 3 | 10 |
|  | **Total** | **9** | **30** |

**II. Semester**

|  |  |  |  |
| --- | --- | --- | --- |
| **CODE** | **COURSES** | **CREDIT** | **ECTS** |
| FE504 | Derivative Securities and Markets | 3 | 10 |
| FE512 | Analysis of Financial Time Series | 3 | 10 |
| FE5XX | Elective I | 3 | 10 |
|  | **Total** | **9** | **30** |

**III. Semester**

|  |  |  |  |
| --- | --- | --- | --- |
| **CODE** | **COURSES** | **CREDIT** | **ECTS** |
| FE600 | Selected Topics in Financial Econometrics | 3 | 10 |
| FE5XX | Elective II | 3 | 10 |
| FE5XX | Elective III | 3 | 10 |
|  | **Total** | **9** | **30** |

**IV. Semester**

|  |  |  |  |
| --- | --- | --- | --- |
| **CODE** | **COURSES** | **CREDIT** | **ECTS** |
| FE5XX | Elective IV | 3 | 10 |
| FE601 | Selected Topics in Corporate Finance | 3 | 20 |
|  | **Total** | **6** | **30** |

**V. Semester**

|  |  |  |  |
| --- | --- | --- | --- |
| **CODE** | **COURSES** | **CREDIT** | **ECTS** |
| FE699 | Thesis | 0 | 30 |
|  | **Total** | **0** | **30** |

**VI. Semester**

|  |  |  |  |
| --- | --- | --- | --- |
| **CODE** | **COURSES** | **CREDIT** | **ECTS** |
| FE699 | Thesis | 0 | 30 |
|  | **Total** | **0** | **30** |

**VII. Semester**

|  |  |  |  |
| --- | --- | --- | --- |
| **CODE** | **COURSES** | **CREDIT** | **ECTS** |
| FE699 | Thesis | 0 | 30 |
|  | **Total** | **0** | **30** |

**VIII. Semester**

|  |  |  |  |
| --- | --- | --- | --- |
| **CODE** | **COURSES** | **CREDIT** | **ECTS** |
| FE699 | Thesis | 0 | 30 |
|  | **Total** | **0** | **30** |

**COURSE DESCRIPTIONS**

**MUST COURSES**

**FE 500           Fundamentals of Finance**

Equilibrium theory and arbitrage; Financial asset valuation, CAPM and APT; Portfolio creation, optimal portfolios; Equilibrium prices and allocations; Mean-variance analysis; Multi-period observations of security markets; Decision making under uncertainty; Martingale property of security prices.

**FE 501           Financial Calculus**

From random walk to Brownian motion, quadratic variation and volatility, stochastic integrals, martingale property, Ito formula, geometric Brownian motion, solution of Black-Scholes equation, stochastic differential equations, Feynman-Kac theorem, Cox-Ingersoll-Ross and Vasicek term structure models, Girsanov's theorem and risk neutral measures, Heath-Jarrow-Morton term structure model, exchange-rate instruments.

**FE 502           Financial Econometrics**

Basic financial time series modeling extended to advanced topics on stochastic volatility, testing and comparing Value-at-Risk (VaR) measures and fixed income econometrics; overview of dynamic models AR, MA, ARMA, VAR and forecasting with ARIMA and VAR models; applications of Arch and Garch models in forex and stock returns; efficient market hypothesis and predictability of asset returns.

**FE 504           Derivative Securities and Markets**

Introduction to options, forward and futures markets; determinants of option values; portfolio strategies using options; put - call parity, spot - futures parity, early exercise; binomial model; Black - Scholes model; option deltas and elasticities; delta hedging, pitfalls of dynamic hedging; forward rate agreements (FRA), futures implied forward rates; interest rate, cross currency and equity swap methods; combining derivatives to engineer new products.

**FE 507           Principles of Financial Engineering**

Financial instruments: money markets, bonds, the spot curve, stocks, future markets, options; Arbitrage: static arbitrage, intertemporal arbitrage; Exchanging risk; Portfolio choice; Equilibrium on the stock exchange; Trade and information; Intertemporal valuation. Main issues on static and dynamic optimization, stochastic analysis, statistical expectations and their financial applications.

**FE 512           Analysis of Financial Time Series**

Returns and their empirical characteristics; Linear time series models and their applications; Volatility modeling via conditional heteroscedastic models; Nonlinear models, neural networks and their applications; High-frequency data analysis, realized volatility, and market microstructure; Continuous-time diffusion models and Ito's Lemma; Value at Risk (VaR), stress test, extreme value analysis and quintiles; Multivariate models, factor models, and their applications; Multivariate conditional heteroscedastic models; Markov Chain Monte Carlo methods and their applications.

**ELECTIVES**

**FE 503           Optimization Models in Economics and Finance**

Overview of optimization concepts: modeling-analysis-decision loop in financial and economic practice; linear, non-linear, integer and dynamic programming applications in finance and economics. Discrete optimization models in finance: modeling possibilities through binary and integer variables; relaxation methods; branch-and-bound methods; simulated annealing and genetic algorithms. Quadratic and convex programming, applications in portfolio management by using of linear and nonlinear programming software.

**FE 505           Investment Analysis and Portfolio Theory**

Financial securities and markets; fixed income securities, equity and derivative securities; mean-variance portfolio theory; the portfolio selection process; single-index, multi-index models and grouping technologies; efficient frontier and optimum portfolios; equilibrium models in the capital markets; Capital Asset Pricing Model (CAPM) and Arbitrage Pricing Model (APM); security analysis and portfolio theory; performance evaluation and efficient market hypothesis.

**FE 506           Stochastic Modelling in Finance**

Financial problems as dynamical systems; simulation as a solution procedure for complex dynamic models; complex nonlinear dynamic phenomena; stochastic dynamic models; system dynamics methodology; stock-flow modeling; policy design and improvement by simulation experiments; financial strategy applications and cases.

**FE 510           Computational Finance**

Simulation methodology; software packages; uniform and non-uniform random variate generation; Monte-Carlo methods; variance reduction techniques; splines; matrix factorizations; finite difference methods; value-at-risk and option pricing computations.

**FE 511           Financial Risk Analysis and Management**

Financial innovation; new types of risk and evolution of risk management products; sources of risk and risk profile; measuring market risk, credit risk, operational and legal risks; analytical models and estimation problems; using and designing derivative instruments to manage risk; securitization, hedging and arbitrage fundamentals; examples and applications of risk management in financial and non-financial institutions.

**FE 513           Fundamentals in Corporate Finance**

Fundamental concepts; time value, risk and return; valuing stocks and bonds; financial statement analysis; break-even and risk analysis; investment criteria; optimal capital structure; types of financing; discussion on Initial Public Offerings (IPOs), mergers and acquisitions.

**FE 514           Uncertainty and Information in Finance**

Random variables, expectations and variance, Binomial, Poisson and Normal Distributions, Law of Large Numbers; methods of data analysis, univariate and multi-variate models, estimation, confidence intervals, hypothesis testing problems, analysis of variance, regression and correlation analysis, goodness of fit tests, maximum likelihood estimation; Central Limit Theorems, generating and characteristic functions, moments, conditional probabilities; Markov Chains, random walks as martingales, discrete to continuous stochastic processes, binomial model of stock prices, Arbitrage Pricing Theory, pricing of a European Call Option, Black-Scholes equation.

 **FE 515          Asset Pricing**

Arbitrage and Asset Pricing: Induced Preference Approach; Representative Consumer; Diversification and Asset Pricing; Multi-period Asset Pricing: Complete Markets, Incomplete Markets; General Asset Pricing.

**FE 516          Behavioral Finance**

This course aims to further strengthen this foundation, with a discussion of recent developments in modeling economic decision making processes and how they shape markets. The course will comprise critical reviews of efficient market hypothesis, rationality, heuristics, prospect theory, framing, anomalies in economic behavior, behavioral game theory, intertemporal and group decision making, market pricing and returns. Real-time local and global market trends will be analyzed and portfolio management decisions critically assessed, with rigorous applications of the theoretical material introduced.

**FE 621          Forecasting of Financial Data**

Types of forecasting method, The dangers of extrapolation, Are forecasts genuinely out-of-sample? Brief Review of Time-Series Analysis: SARIMA models and related topics, State space models, Time-series model building Univariate Forecasting Methods:The prediction problem, Model-based forecasting, Kalman filters, Ad hoc forecasting methods, Some interrelationships and combinations. Criteria for choosing a forecasting method, Measuring forecast accuracy, Forecasting competitions and case studies, Choosing an appropriate forecasting method, Expected mean square prediction error

**FE 622          Wavelet Analysis of Financial Data**

Introduction to Fourier transforms (FT): Definition, properties and continuous time FT pairs. Power spectrum, Wiener-Kintchine formula, F(Fast)FT. Problems with FFT.

Linear Filters and volatility estimation.Wavelets and Wavelet Transforms (WT): Definitions and properties. DWT, Haar, Daubechies, Symlet , etc wavelets. Multiple Resolution Analysis (MRA)

Detrending with WT. Denoising with DWT.Wavelets and long memory. Stein’s unbiased risk estimate

**FE 623          Levy Processes in Finance**

 Stochastic Processes and Filtrations, Classes of Processes, Markov Processes, Martingales,finite and Infinite-Variation Processes, Characteristic Functions,Stochastic Integrals and SDEs, Equivalent Martingale Measure, Pricing Formulas for European Options,

 Imperfections of the Black–Scholes Model, Levy Processes, Definition and Properties,

Examples of Levy Processes: The Poisson Process, The Compound Poisson Process, The Gamma Process, The Inverse Gaussian Process,The Generalized Inverse Gaussian Process, The Variance Gamma Process, The Normal Inverse Gaussian Process, The CGMY Process, The Meixner Process,The Generalized Hyperbolic Process.Stock Price Models Driven by Lévy Processes: Parameter estimation, The Levy Market Model, Pricing Formulas for European Options, Lévy Models with Stochastic Volatility: The BNS Model, The BNS Model with Gamma SV. Simulation Techniques for Lévy Models.

**FE 624          Multivariate Financial Time Series Analysis**

Multivariate ordinary least square (OLS) regression models: statistical factor models, multivariate macroeconomic models, transfer function (distributed-lag) models, financial asset pricing models: CAPM, Fama-French, Carhart etc.

Vector Autoregressive (VAR) processes: basic assumptions and properties, order selection criteria, MLE estimation, forecasting, structural analysis with VAR models: Granger causality, impulse response analysis, forecast error variance decomposition.

Cointegrated processes, common stochastic trends, Vector Error Correction Models (VECM) :

cointegration tests (Johansen, Granger etc.), specification and lag-order selection for VECM, forecasting, structural analysis with VECM.

Structural and conditional models : structural VAR's and VECM's, systems of dynamic simultenous equations.

Vector Autoregressive Moving Average (VARMA) processess : The pure MA and pure VAR representations of VARMA process, a VAR(1) representation of VARMA process, forecasting VARMA processes, transforming and aggregating VARMA processes, interpretation of VARMA models.

Multivariate volatility and MGARCH models : examples of MGARCH models (CCC, DCC, BEKK etc.), specification and properties of MGARCH models, estimation, volatility spillover analysis.

**FE 531          Global Financial Systems and Crisis**

In the first part of the course, standard models of aggregate economic growth and the broad macroeconomic indicators, such as Gross Domestic Product (GDP), Rate of inflation, Per capita income, Unemployment Level, Balance of Payments are reviewed. In the second part, the effects of financial development and trade on economic growth and structure are addressed. As the last part, the extant financial crises, which threaten the global economic growth and create asset pricing bubbles are assessed. All these issues will give students important insights to evaluate the recent global economic and financial environment.

**FE 532          Research in International Finance**

Topics to be discussed will include foreign exchange markets, international financial markets, international banking, currency derivative markets, Euromarkets, risk management, and investment decisions in the global marketplace.

**FE 533          Economics and Financial Systems of Emerging Markets**

Topics cover globalization and the roles of the emerging markets in portfoloio diversification and risk management.

**FE 596          Research Methods in Economics and Finance**

The course objective is to enable the students to start doing their own research on topics in economics and finance. The topics vary based on the students’ research interest.

**FE 625          Neural Networks in Finance**

Classification of artificial neural networks and learning methods. Classic models of artificial neural networks. Artificial neural network applications

**FE 626          Econophysics**

R/S analysis, Hurst exponent, monofractals, fBm, fGn, Hölder exponent, Legendre transform, Multifractals, wavelet transform, multifractal detrended fluctuation analysis (MFDFA), fat tail and long memory in financial data

**FE 627          Advanced Risk Modeling in Financial Markets**

Risk measures, value at risk (VaR), conditional value at risk (cVaR), tail value at risk (TVaR), Shui-Gerber risk, ruin theory, damage function, extreme value theory, credit risk models.

**FE 631          Advanced Macroeconomics and Finance**

The topics cover filters and business cycles estimation, structural breaks and economic instabilities, Non-linear models and Generalized Method of Moments (GMM)

**FE 632          Advanced Microeconomics**

The topics include the single equation linear model, instrumental variables, system estimation, Maximum Likelihood estimation technique, discrete response models and static and dynamic panel data models.

**FE 633          Empirical Topics in Economics and Finance**

Students will have to read some of the truly seminal works in empirical economics and finance. Empirical exercises, which will require students to write their own procedures and to use real market data. In addition to the empirical exercises, students will have to produce a research project on a topic of their choice, which will extend the previous literature in a non-trivial fashion.

**THESIS AND SEMINERS**

**FE 600    Special Topics in Financial Econometrics**

Special topics in financial engineering selected to suit the interests of the students.

**FE 601    Special Topics in Corporate Finance**

Special topics in financial engineering selected to suit the interests of the students.

**FE 699           Thesis (MSc)**

PhD Thesis

**CONTACT PERSONS**

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