Table 4: Courses offered at HUB and XMU

Course name	Type	Duration	Frequency	Contents	Target group	Location	Prospective instructor	Compulsory
Advanced Econometrics	Lecture	4 weekly hours	once a year	Single-equation regression (OLS and 2SLS), Wald estimator and LATE, system estimation, panel regression, robust standard errors, LM-Tests, maximum likelihood, binary response models, limited dependent variables models, selection models, selected semiparametric methods such as nonparametric regression, partially linear models, or quantile regression.	MA/PhD	HUB	Bernd Fitzenberger	Yes*
Advanced Macroeconomic Analysis I	Lecture	4 weekly hours	once a year	The objective of this course is to teach M.A. and Ph.D. students to use macroeconomic concepts and techniques for their own research and incorporates a higher degree of formal analysis than in the introductory master's lecture (IAMA). Part I (Prof. Burda): Methods of modern macroeconomics for researchers in the field. Stationary Markov environments, state-space methods, stochastic difference equations. Dynamic programming and Lagrangian methods, complete markets, dynamic stochastic general equilibrium models, solution techniques. The Ramsey problem. Empirical interpretation of macroeconomic shocks; structural versus reduced form. Part II (Prof. Weinke): Dynamic stochastic general equilibrium (DSGE) models for positive and normative macroeconomic analysis. To this end a number of theoretical and empirical concepts are presented: The computation of impulse response functions, structural vector autoregressions, as well as an introduction to structural estimation. On the normative side the concept of Ramsey optimal policy is presented.	MA/PhD	HUB	Michael Burda Lutz Weinke	No
Advanced Macroeconomic Analysis II	Lecture	4 weekly hours	once a year	The first part of the course studies monetary theory: how future expected money supply affects the current price level, why money can be written in the utility function and what is required to determine a unique equilibrium with rational expectations. Turning to the foundations of New Keynesian Macroeconomics, we analyse why monopolistic competition leads to an active role for monetary policy, derive the forward looking Phillips curve and study optimal monetary policy. The second part of the course is dedicated to the solution of DSGE models in general and in particular models in which labour market frictions play a prominent role. It is designed to develop and sharpen students' prior knowledge of dynamic macroeconomics and econometrics with a mixture of lectures on state-of-the-art solution and estimation techniques for macroeconomic models and application of the techniques with standard software packages and models from the literature.	MA/PhD	HUB	Frank Heinemann, Mathias Trabandt	No

Advanced Mathematics	Crash course		once a year	This background course on mathematics aims to provide fundamental mathematical knowledge essential for advanced economic analysis. Although open to all master students, it is specifically tailored to those wishing to directly pursue the advanced Y-track of courses. Therefore in content and form, this intensive course is intended to deliver methods beyond refreshing advanced calculus and linear algebra. The course solely deals with deterministic mathematics. For some theorems formally rigorous proofs are presented in order to make participants more comfortable with - and ideally to provide some intuition for - constructing and understanding of mathematical proofs. Throughout the course, proper use of notation will be stressed.	MA/PhD	HUB	Wolfgang Härdle	No
Advanced Microeconomic Theory	Lecture + Tutorial	2+2 weekly hours	once a year	The students understand fundamental microeconomic concepts and tools on a very advanced level. Topics, contents: Theory of consumption and production, optimal decision under uncertainty, general equilibrium, matching, introduction to game theory.	PhD	HUB	Renaud Foucart, Jana Friedrichsen, Steffen Huck, Marco Runkel	No
Analysis of Panel Data	Lecture	4 weekly hours	once a year	Basic concepts, models with fixed and random effects, specification tests, simultaneous equations and dynamic models, models for qualitative dependent variables.	MA/PhD	HUB	Bernd Droge	No
Applied Econometrics	Lecture + Tutorial	3+2 weekly hours	once a year	The course introduces econometric methods to analyse cross-sectional data, panel data and time series data and discusses their applicability in practice. The following topics are covered: extensions and applications of the linear model; instrumental variable estimation; binary response models; truncated and censored regression, static panel data models; specification, estimation, validation and forecasting of autoregressive models. The application of these methods is explained and illustrated by means of empirical examples.	MA/PhD	HUB	Bernd Droge	No
Applied Predictive Analytics	Lecture	4 weekly hours	once a year	The model give students an opportunity to participate in a real-world forecasting challenge related to planning problems in business areas such as marketing, finance, or others. In this scope, students have the opportunity to develop a variety of skills, including: Working in a real-world project setting allows students to further develop their teamwork skills and project management abilities. Students are acquainted with contemporary software packages for prediction analytics. Students are able to develop advanced forecasting models using a variety of techniques from statistics, machine learning, and other domains. Students advance their knowledge in data integration, preparation, and transformation which allows them to create predictive variables from noisy real-world data sets.	MA/PhD	HUB	Stefan Lessmann	No

Name	Type	Hours	Frequency	Content	Level	Institution	Lecturer	Credits
Ausgewählte Kapitel der Statistik und Stochastik	Seminar	2 weekly hours	twice a year	Topics include, but are not limited to, Bayesian reference priors, The Le Cam distance between density estimation and the Gaussian white noise model in the case of small signals, Some ideas about deep learning, Nonparametric adaptive estimation for grouped data, Introduction to an estimation error of occupation time functionals, Lower bounds for the estimation of functionals in nonparametric boundary models	MA/PhD	HUB	Markus Reiß	No
Ausgewählte Themen der Stochastik I - Themen des statistischen maschinellen Lernens	Lecture + Tutorial	2+2 weekly hours	once a year	In dieser Kurzformat-Vorlesung werden unterschiedliche Aspekte der mathematischen Analyse statistischer Lernmethoden behandelt: ▪ Prof. Blanchard: Stochastische Gradientenmethoden und statistisches Lernen ▪ Dr. Carpentier: Online Lernen und Bandits-Theorie ▪ Dr. de Wiljes: Nichtüberwachtes Lernen und Clustering ▪ Dr. Wahl: Dimensionsreduktion, eine moderne Perspektive	MA/PhD	HUB	Martin Wahl	No
Ausgewählte Themen der Stochastik II	Lecture + Tutorial	2+2 weekly hours	once a year	This course covers various topics in Stochastic such as Bayesian inference, Spectral estimation of scalar diffusions based on high frequency data, Exact and Asymptotic Tests on a Factor Model in Low and Large Dimensions with Applications and other topics.	MA/PhD	HUB	Taras Bodnar	No
Business Analytics and Data Science	Lecture + Tutorial	2+2 weekly hours		The module Business Analytics and Data Science is concerned with theories, concepts, and practices to inform and support managerial decision-making by means of formal, data oriented methods. Students have the opportunity to develop a variety of skills, including: ▪ Students are familiar with the three branches of descriptive, predictive and prescriptive analytics and appreciate the relationships between these streams. ▪ Given some data, students are able to select appropriate techniques to summarize and visualize the data to maximize managerial insight. ▪ Students understand the potential and the limitations of predictive analytics to aid decision making. They comprehend when and how business applications can benefit from predictive analytics. Given some decision task, they are able to recommend suitable prediction methods. ▪ Students are familiar with statistical programming languages. Using standard tools, they can develop basic and advanced prediction models and assess their accuracy in a statistically sound manner.	MA/PhD	HUB	Stefan Lessmann	No
Datenanalyse I	Lecture + Tutorial	2+2 weekly hours	once a year	Survey design: Operationalization, Validity Univariate statistics: Graphical representation (stem-and-leaf, strip plot, kernel density, violin plot), Coeffcients (quantile, entropy, higher moments, hinges and spreads), Tests (t-Tests, Mann-Withney-U, Median, Wilcoxon, Kruskal-Wallis,	BA/MA	HUB	Sigbert Klinke	No

Course	Type	Hours	Frequency	Content	Level	Univ	Lecturer	
				ANOVA, Friedman), Transformations (Power, Box-Cox) Outliers: Identification of outliers, robust coefficients for location and dispersion (L- and M-estimators for location) Treatment of missing values: Types (MAR, MCAR, MNAR), Imputation methods (single, multiple) Bivariate statistics: Graphical representation (sunflower plot, mosaic plot, trellis display), Subgroup analysis				
Datenanalyse II	Lecture + Tutorial	2+2 weekly hours	once a year	Bivariate statistics: Coefficients and tests (association and PRE- measure, Cohen's kappa, relative risk, odds ratio) Multivariate statistics: Principal component analysis, Exploratory factor analysis (reliability for sum scores), Cluster analysis Regression methods: Simple linear regression, Multiple linear regression, Generalized linear regression, Non- and Semiparametric Regression, Classification and regression trees, Neural networks	BA/MA	HUB	Sigbert Klinke	No
Digital Economy and Decision Analytics	Lecture	3 weekly hours	Twice a year	The evolution from analogue to digital technologies continues to dominate the attention of decision makers today. Many tools in industrial production processes have been automated or replaced by highly complex mechanisms with pre-programmed decision-making. The change to digital modes of operations increasingly determines the lives of individuals and does so in increasingly unexpected ways.	MA/PhD	HUB	Wolfgang Härdle	No
Econometric Methods	Lecture + Tutorial	4+2 weekly hours	once a year	Estimation and testing in the general linear model, generalized least squares estimation, asymptotic theory, maximum likelihood estimation and likelihood based testing, nonlinear regression models, stochastic regressors, instrumental variable estimation, (generalized) method of moments.	MA/PhD	HUB	Bernd Droge	Yes*
Econometric Projects	Block course	Adequate to 2 weekly hours	once a year	Students conduct their own empirical studies, present their results and write a seminar paper to successfully complete this project seminar. A component of the seminar is an ungraded presentation.	MA/PhD	HUB	Bernd Fitzenberger	No
Economic Risk Seminar	Seminar	2 weekly hours	Twice a year	The Economic Risk Seminar covers a wide spectrum of topics with some focus on the quantitative analysis of financial markets.	MA/PhD	HUB		No
Einführung in die nichtparametrische Statistik	Lecture	2 weekly hours	once a year	Dichteschätzung, Nichtparametrische Regression, Untere Schranken, Wahl des Glättungsparameters, Klassifikation und Lerntheorie	BA/MA	HUB	Markus Reiß	No
Estimation of Treatment Effects	Lecture + Tutorial	2+2 weekly hours	once a year	This course presents nonparametric and semiparametric regression techniques and modern microeconometric methods for treatment effects estimation. The treatment focuses on the potential outcome approach, and students learn various methods to account for selection based on observables (regression, matching,	MA/PhD	HUB	Bernd Fitzenberger	No

				inverse probability weighting) and for selection based on unobservable (Heckman selection correction, difference-in-differences, panel regression, instrumental variable regression, regression discontinuity design). These methods are used for cross-section data and longitudinal data, both repeated cross-sections and panel data. Students will familiarize themselves with applying the methods to real empirical data using Stata.				
Introduction to Advanced Macroeconomic Analysis	Lecture + Tutorial	2+2 weekly hours	once a year	Fundamental themes of macroeconomics. Overview of theories of economic growth; stylized facts of business cycles and descriptive and statistical methods used to study them. Introduction to methods of macroeconomic analysis, including comparative statics, stochastic difference equations, dynamic programming, Lagrangian methods, the maximum principle. Dynamic systems, stability, expectations. Microeconomic models of intertemporal choice; general equilibrium models of dynamic economies with flexible and sticky prices.	MA/PhD	HUB	Michael Burda	No
Introduction to Advanced Microeconomic Analysis	Lecture + Tutorial	4+2 weekly hours	once a year	Topics are Competitive Markets - Partial Equilibrium, Competitive Markets - General Equilibrium, Externalities and public goods, Monopoly - Price setting, Monopoly - Price discrimination, Monopoly - Product quality, Oligopoly, Asymmetric Information - Lemon's Model, Asymmetric Information - Hidden Information (Adverse Selection), Asymmetric Information - Moral Hazard	MA/PhD	HUB	Roland Strausz	No
Mathematical Foundations for Finance and Insurance	Lecture	4 weekly hours	once a year	In the first part of the course, we discuss basic tools of asymptotic theory in statistics: convergence in distribution, in probability, almost surely, in mean. We also consider main probability limit laws: LLN and CLT. Then we deal with the usual statistics computed from a sample: the sample distribution function, the sample moments, the sample quantiles, the order statistics. Properties, such as asymptotic normality and almost sure convergence will be derived in the lecture. Afterwards, comes the asymptotics of statistics concocted as transformations of vector of more basic statistics. Next part concerns statistics arising in classical parametric inference and contingency table analysis. These include maximum-likelihood estimates, likelihood-ratio tests, etc. Last part of the course treats U-statistics, statistics obtained as solutions of equations (M-estimates), linear function of order statistics (L-estimates) and rank statistics (R-estimates).	MA/PhD	HUB	Wolfgang Härdle	No
Mathematische Statistik	Lecture + Tutorial	4+2 weekly hours	twice a year	This course provides a unified and self-contained presentation of the main approaches to and ideas of mathematical statistics. It collects the basic mathematical ideas and tools needed as a basis for more serious study or even independent research in statistics. The majority of existing courses in mathematical statistics follow the classical asymptotic framework. Yet, as modern statistics has changed rapidly in recent years, new methods and approaches have appeared. The	MA/PhD	HUB	Vladimir Spokoiny	No

				emphasis is on finite sample behaviour, large parameter dimensions, and model misspecifications.				
Microeconometrics	Lecture + Tutorial	2+2 weekly hours	once a year	Models for qualitative and limited dependent variables; Maximum-likelihood estimation; Binary response models (in particular logit- and probit models); Multinomial and ordered response models; Models for censored and truncated data; Sample selection problems; Models for duration and count data. In the tutorials the methods are applied to empirical data.	MA/PhD	HUB	Christoph Breunig	No
Modern Methods in Applied Stochastic and Nonparametric Statistics	Seminar	2 weekly hours	twice a year	Topics include Smoothing the payoff for efficient computation of basket option, Adaptive weights clustering AWC, Bootstrap for high dimensional online multiscale covariance matrix change-point detection, Numerical aspects of Wasserstein distance, Wasserstein barycenters, and Hellinger-Kantorovich distance, Dimension reduction of large scale OU processes, Non-asymptotic confidence sets in 2-Wasserstein space and their application to change point detection, Bootstrap confidence sets for spectral projectors of sample covariance, Density projection schemes for McKean-Vlasov equations and explicit solutions of OU type equations, Operator convex functions and matrix Bernstein type inequality, An introduction to algebraic statistics, A mean field SDE with Neumann boundary conditions, Efficient pricing in rough Bergomi	MA/PhD	HUB	Vladimir Spokoiny	Yes*
Non- and Semiparametric Modelling	Lecture	2 weekly hours	once a year	The course Non- and Semiparametric Modelling gives an overview over the flexible regression methods. The course starts with an introduction into the density estimation (histogram, kernel density estimation). Nonparametric regression methods and their applications are discussed. Furthermore additive models will be introduced in the course. At the end of the course the students will be able to implement methods to solve practical problems.	MA/PhD	HUB	Marlene Müller	Yes*
Reading Course in Bayesian Econometrics	Reading Course	2 weekly hours	once a year	Bayesian methods have become increasingly popular, especially in macroeconomics. The large dimensionality of macro-econometric models and the complexity of modern DSGE models often require the use of prior information and computational algorithms to conduct econometric inference. This course will give an introduction to Bayesian estimation both from a technical and practical point of view. The curriculum will cover basic notions of Bayesian inference and posterior simulators, with applications to regression and state space models. Empirical applications and more advanced topics will be treated in reading groups. Although the focus of the course is on macro-oriented models, micro-oriented student presentations are encouraged.	PhD	HUB	Andreas Tryphonides	No
Selected Topics in Econometrics	Lecture	2 weekly hours	once a year	The seminar covers selected topics in econometrics. The focus is on impact evaluation, treatment effects and causal analysis. Each participant has to give an	MA/PhD	HUB	Christoph Breunig	No

oral presentation.

Statistical Tools in Finance and Insurance	Lecture	4 weekly hours	once a year	The course offers an overview of advanced statistical methods in quantitative finance and insurance which should be comprehensible for a graduate student in financial engineering as well as for an inexperienced newcomer who wants to get a grip on advanced statistical tools applied in these fields.	MA/PhD	HUB	Wolfgang Härdle	No
Statistics of Financial Markets I	Lecture	4 weekly hours	once a year	The course Statistics of Financial Markets I starts with an introduction into the basic concepts of option pricing and its stochastic foundations. After a short revision of basic statistical concepts we present the Wiener process as the core element of a probabilistic financial market model. Itô's calculus allows us to reach the first milestone of the course - the Black-Scholes (BS) European Option Pricing formula. The BS model is simple but seminal - as argued by Black in 1992: "Yet that weakness (simplicity) is also its greatest strength. People like the model because they can easily understand its assumptions … and if you can see the holes in the assumptions you can use the model in more sophisticated ways." This is also the main message of this part of the course - students should understand the BS model, see its strength and understand the possibility of its generalizations. The portfolio insurance (hedging) issues, concept of implied volatility, and tree-based (binomial and trinomial trees) are discussed. In addition to the European style derivatives the valuation of the American and modern Exotic derivatives are discussed. This course is not limited to the description of the models and methods but focuses on the statistical analysis, presents the applications to real financial data. In addition, important issues e.g. calibration to market data and connected numerical and statistical pitfalls are presented.	MA/PhD	HUB	Wolfgang Härdle	No
Statistics of Financial Markets II	Lecture	2 weekly hours	once a year	Value at Risk, backtesting, time-series models ARMA, unit-root tests, ARCH, GARCH models, Copulae dependence concept, Extreme Values, Neural Networks.	MA/PhD	HUB	Wolfgang Härdle	No
Statistics of Financial Markets II	Lecture	2 weekly hours	once a year	The course focuses on quantitative methods in risk management such as Value at Risk (VaR) and backtesting. The implications of the current Basel II directive to the risk management of the financial institution are discussed. The students will be equipped with the knowledge of the standard time-series models ARMA, unit-root tests, ARCH and GARCH models that are essential for understanding the standard risk-management models e.g. Risk Metrics methodology. The advanced statistical methods based on the Copulae dependence concept, Extreme Values, Neural Networks as well nonparametric and adaptive methods are introduced and applied to the risk management problems.	MA/PhD	HUB	Wolfgang Härdle	No
Stochastik I	Lecture + Tutorial	4+2 weekly hours	once a year	Wahrscheinlichkeitsräume, Bedingte Wahrscheinlichkeiten und Unabhängigkeit, Erwartungswert, Varianz und Kovarianz, Grenzwertsätze, Einführung in die	BA/MA	HUB	Markus Reiß	Yes*

				Schätztheorie				
Stochastik II (Stochastic Processes)	Lecture + Tutorial	4+2 weekly hours	once a year	Topics include some important processes, General theory of stochastic processes, The conditional expectation, Martingale theory, Markov chains: recurrence and transience, Ergodic theory, Weak convergence	BA/MA	HUB	Markus Reiß	Yes*
Stochastische Analysis	Lecture + Tutorial	4+2 weekly hours	once a year	Konstruktion und Eigenschaften der Brownschen Bewegung, Martingale in stetiger Zeit, stochastische Itô-Integrale, Itô-Formel, stochastische Differentialgleichungen (SDEs) und ihr Zusammenhang mit partiellen Differentialgleichungen, Satz von Girsanov, Darstellungssatz von Itô	MA/PhD	HUB	Perkowski, Nicolas	No
Stochastische Analysis und Stochastik der Finanzmärkte	Research seminar	3 weekly hours	twice a year	Topics include equilibrium model for commodity spot and forward prices, Simulation of conditional diffusions via forward--reverse stochastic representations, Backward Stochastic Differential Evolutionary Systems with Singular Conditions and Optimal Portfolio Liquidation, Strong Supermartingales and Portfolio Optimisation under Transaction Costs, On a stochastic Fourier transformation, Numerical scheme for quasilinear SPDE's via Backward doubly SDE's, Insider trading, arbitrage profits and honest, The Skorokhod embedding problem for homogeneous diffusions and applications to stopping contests, Trading with Small Price Impact	MA/PhD	HUB	Dirk Becher, Ulrich Horst	No
Stochastische Finanzmathematik I	Lecture + Tutorial	4+2 weekly hours	once a year	Einführung in zeitlich diskrete stochastische Finanzmarktmodelle und die entsprechenden martingaltheoretischen und funktionalanalytischen Methoden: Arbitragefreiheit und Martingalmaße, Finanzderivate und ihre Bewertung, Black-Scholes-Formel, Absicherungs-strategien, optimales Stoppen und amerikanische Optionen, ggf. elementare Einführung in zeitstetige Modelle	BA/MA	HUB	Dirk Becherer	No
Financial Mathematics (Stochastische Finanzmathematik II)	Lecture + Tutorial	4+2 weekly hours	once a year	Stochastic finance in time-continuous; Itô processes, diffusion models and martingale methods; application to the valuation and hedging of the risk from derivative financial instruments; implied volatility smile modelling; models for interest rate derivatives, including modern "Libor" market models	BA/MA	HUB	Ulrich Horst	No
Time Series Analysis	Lecture	4 weekly hours	once a year	Classical components models; stochastic processes; stationarity; ARIMA processes, GARCH models; specification, estimation and validation of models; forecasting; unit root tests; multivariate extensions: VAR processes, causality and impulse response analysis, cointegrated processes. In the tutorials the time series methods are applied to empirical data.	MA/PhD	HUB	Bernd Droge	No
Mathematical Statistics	Seminar	2 weekly hours	Twice a year	The Mathematical Statistics Seminar covers a wide spectrum of topics with some focus on quantitative analysis methods.	MA/PhD	WIAS	Wolfgang Härdle, Vladimir Spokoiny	Yes*
Advanced Corporate	Elective	1 semester	once a	This course first surveys the basic and common theories applied incorporate	MA/PHD	XMU	Haiwei Jing	No

Finance			year	finance research. It then examines many of the important topics in corporate finance, with an emphasis on empirical research, including both seminal papers and working papers on the cutting edge of the field.				
Advanced Econometrics I;	Required	1 semester	once a year	This course is offered to the first-year graduate students. This course introduces the probability and statistics theory, which provides necessary mathematical tools for modelling uncertainty and performing quantitative analysis in econometrics. At the end of the course, students are expected to have the knowledge of random variables, distributions, estimations, and hypothesis testing. They should understand the ideas and methods used in developing the probability and statistics theory, and have the skills of performing statistical analysis.	MA/PHD	XMU	Ming Lin	No
Advanced Econometrics II	Required	1 semester	once a year	This course is the continuation of Probability and Statistic Theory offered last semester. The course begins with an introduction of the classic linear regression (CLR) models, and then relaxes assumptions gradually. Besides CLR models, this course covers linear regression models with I.I.D. observations, linear regression models with dependent observations, linear regression models with HAC disturbances, instrumental variables regression, GMM and MLE. This course also touches several frontier topics such as model and variable selection method, resampling methods and nonparametric econometrics. This course aims to provide solid econometric foundation for both theorists and empirical economists.	MA/PHD	XMU	Ying Fang	No
Advanced Financial Economics	Required	1 semester	once a year	This course aims to build a solid foundation in finance theory for master and PhD students in Finance. Important topics include portfolio choice, mean-variance analysis, arbitrage, stochastic discount factors, contingent claims markets, factor pricing models, consumption-based asset pricing models, dynamic equilibrium models, option pricing. This course also covers some relevant numerical techniques, econometric methodologies, and empirical strategies.	MA/PHD	XMU	Chao Ma	No
Advanced Macroeconomics I	Required	1 semester	once a year	This course is designed for the first-year graduate students. We study both the major models and the dynamic optimization methods in modern macroeconomics. Its goal is to prepare students more advanced courses and research in macroeconomics and monetary economics. The course will be taught in English. Since this is a one-semester course, we cannot cover all the models in modern Macroeconomics. Hence, we focus on models in the most important fields: growth theory and economic fluctuation. To be more specific, we will analyse the following models in detail: Solow Model, Ramsey-Koopmans-Cass (RCK) model, Overlapping-Generations Model, Real-Business-Cycle Model and New-Keynesian Model. Dynamic Optimization methods are the necessary tools for	MA/PHD	XMU	Yu Zhang	No

				modern macroeconomics. We will give an introduction on calculus of variation (for continuous-time optimization) and dynamic programming (for discrete-time optimization)				
Advanced Macroeconomics II	Required	1 semester	once a year	This course aims to introduce students to the recent development in the macroeconomic research, within the framework of dynamic stochastic general equilibrium (DSGE) models in general, and New Keyesian DSGE models in particular. With these tools at hand, we will discuss monetary policy, inflation and business cycle (Gali, 2008). The course, with a brief introduction to MATLAB, will be structured into three parts: 1. Numerical methods and macroeconomic models 2. New Keynesian DSGE models and monetary policy 3. Empirical methods that bring models to the data	MA/PHD	XMU	Linlin Niu	No
Advanced Mathematical Statistics	Required	1 semester	once a year	In this course, you will learn: sampling from the normal distributions; order statistics; methods of finding estimators including method of moment estimation and maximum likelihood estimation; properties of point estimators; unbiased estimation; sufficiency and completeness; uniformly minimum-variance unbiased estimator (UMVUE); parametric interval estimation; tests of hypotheses; the trinity of tests; most powerful test; chi-square test; goodness-of-fit test.	MA/PHD	XMU	Ming Lin	No
Advanced Microeconomics I	Required	1 semester	once a year	To introduce the fundamental concepts of Microeconomic models of firms, consumers, decision making under uncertainty, competitive markets, and general equilibrium.	MA/PHD	XMU	Zhi Li	No
Advanced Microeconomics II	Required	1 semester	once a year	This is a core course designed to teach students the current tools of microeconomic analysis, and is a natural continuation of Advanced Microeconomics I. While the focus of learning in Advanced Microeconomics I was the classical theory of choice and perfectly competitive markets, the core concept of Advanced Microeconomics II is Nash equilibrium. This concept and its subsequent refinements will be applied to the analysis of strategic interaction, problems involving information, incentives, and the functioning of imperfectly competitive markets. At the end of the course students should be able to understand and critique the literature in a wide number of fields that heavily use the concepts, including labour economics, industrial organization, public finance, development, and even macroeconomics. What students learn here will form much of their basic repertoire as a professional economist in the future!	MA/PHD	XMU	Brett Graham	No
Advanced Topics in Finance	Elective	1 semester	once a year	This course will review the classical asset pricing theory in discrete time, cover the empirical puzzles, and then will discuss the recent theories that have been	MA/PHD	XMU	Guojin Chen	No

				developed to try to solve the puzzles. The purposes of this course are to introduce some advanced topics in finance to students as well as to give students some basic training in reading and writing.				
Applied Microeconomics	Elective	1 semester	once a year	This course is based on the entire econometric tools you have studied in the first year, but will not teach theoretical econometrics, instead, we will learn, conditional on the available data, how to choose the most powerful/appropriate econometric tools to "tell an empirical story". In other words, this course will bring students to the frontier of applied microeconomics. We will mainly study the usage of various identification strategies by discuss journal articles. Students' active participation in the discussion is strongly expected.	MA/PHD	XMU	Ying Fang	No
Asset Pricing I	Elective	1 semester	once a year	This course, which is the first in the sequence of doctoral seminars offered in finance, is designed to introduce students to the major models of asset pricing and to Rational Expectations models. All of the material is developed from first principles, so there are no formal prerequisites for taking this seminar. It is assumed, however, that students are familiar with basic microeconomic theory and have a working knowledge of both calculus and matrix algebra. The outline that follows provides a brief description of the material that is covered in the course. The general approach will be: • to examine the economic intuition behind each model • provide a mathematically rigorous derivation of the model • discuss the model's important features, and • outline the testable implications of the model.	MA/PHD	XMU	Peilin Hsieh	No
Asset Pricing II	Elective	1 semester	once a year	This course is designed to introduce modern quantitative methodologies for asset pricing in finance (and insurance) with emphasis on continuous-time models and associated risk management in practice. The main asset classes covered are option, rate and credit. The associated numerical implementations are demonstrated via MatLab.	MA/PHD	XMU	Hongbiao Zhao	No
Computational Data Analysis Using Software	Required	1 semester	once a year	This course focuses on using and applying the software rather than programming. We will learn by example with EViews (you are encourage to use R or other software). The emphasis throughout the lectures is on a valid application of the softwares to real data and problems in finance and economic. By the end of the course, students will have good knowledge of : Ø general understanding of SAS and Matlab, familiar with EViews, Ø management of economic data, Ø statistics analysis, Ø econometric analysis. In the class, the corresponding mathematics models are briefly introduced, to the extent that EViews inputs and outputs are well defined. How to tackle real-	MA/PHD	XMU	Haifeng Xu	No

				world problems are trained through case studies.				
Derivatives Analysis	Elective	1 semester	once a year	This course is designed to provide you with a thorough understanding of how trading in derivatives markets actually functions. You will learn why firms trade, how they determine hedging strategies, and how pricing in markets occurs. You will also gain an understanding of trading behaviour and how the market functions via microstructure analysis.	MA/PHD	XMU	Peilin Hsieh	No
Environmental Economics	Elective	1 semester	once a year	The purpose of this course is to help students understand the connection between economics and the environment, and how economic analytical tools can be used to make private and public economic decisions that involve environmental resources. The economic analytical tools that will be discussed in this course include demand-supply analysis, consumption theory and budget constraint, methods to value public goods (based on both revealed-preference and stated-preference approaches), production theory and pollution, market failure and negative externalities, government policies to address negative externalities (for environmental protection), and benefit-cost analysis.	MA/PHD	XMU	Kent Zhao	No
Experimental Economics	Elective	1 semester	once a year	This course is an introduction to experimental economics. Economists have used both laboratory and field experiments to examine the validity of various economic theories as well as advise policy makers and managers on the relative performance of alternative solution approaches to a variety of economic problems. In this course you will get a sound overview over the methodologies employed by experimental economists, many of the classic studies, and recent developments of the field as a whole.	MA/PHD	XMU	Sen Geng	No
Financial Economics	Elective	1 semester	once a year	This course aims to provide students with a firm understanding of the econometric methods used in empirical finance research. Both theoretical finance models and econometric methods are introduced, and the emphasis is on the interplay between the two. The course covers discrete time as well as continuous time models.	MA/PHD	XMU	Tingguo Zheng	No
Fixed Income Analysis	Elective	1 semester	once a year	The purpose of the course is to familiarize the students with the world of fixed income and the characteristics of the various securities traded in fixed income markets. This is not a very technical course, and precise pricing models will not be discussed- they are covered extensively in other courses offered at WISE. We will also focus on public policy issues related to the fixed income markets.	MA/PHD	XMU	Qian Han	No
Labour Economics	Elective	1 semester	once a year	This course is to provide a basic understanding of labour economics, which studies how labour markets work. Important topics include the determination of the income distribution, the economics impact of unions, the allocation of a worker's time to the labour market, the hiring and firing decisions of firms, labour market	MA/PHD	XMU	Xiqian Cai	No

				discrimination, the determinants of unemployment, and the worker's decision to invest in human capital. Besides these traditional topics of labour economics, we will also try to discuss some recent research in labour.				
Law and Economic	Elective	1 semester	once a year	This course provides an introduction to law and economics. Standard economic theory will be applied to analyse law and legal institutions and to study the origin, nature, and consequences of the "rules of the game" as they pertain to individual and group behaviour. Specifically, applications of economic theory in property and contract law, crime and prosecution, and other related topics will be discussed.	MA/PHD	XMU	Cheryl Long	No
Mathematical Economics	Required	1 semester	once a year	This course is designed to introduce to a wide range of mathematical techniques used in graduate level economics courses. Topics include the tools used to analyse equilibrium models, comparative-static models, optimization and dynamic models. Although there is a review for basic calculus and linear algebra, these skills are required to take this course.	MA/PHD	XMU	Sen Geng	No
The Chinese Economy: Transition and Growth.	Elective	1 semester	once a year	This course provides a general survey of the Chinese economy. Building from the ground up, it covers first the geographical endowments, the traditional Chinese economy, the socialist legacies and the market transitions; it then moves into the reform era and focuses on the pattern of economic growth, structural change and development since the late 1970s.The specific sectors in the Chinese economy are examined last, covering selected topics in the rural and urban economy, the international trade and foreign investment, macroeconomics and finance.	MA/PHD	XMU	Lei Meng	No
Time Series Econometrics I	Elective	1 semester	once a year	This is an introductory course to time series analysis. Methods are hierarchically introduced .starting with basic concepts and terminologies, progressing to different data analysis, and ending with different modelling and inference procedures. The course material will cover stationary/nonstationary, linear/nonlinear time series analysis. After this course, students are expected to learn the knowledge and skills needed to do both theoretical and empirical research in fields operating with time series data sets.	MA/PHD	XMU	Haiqiang Chen	No
Urban Economics	Elective	1 semester	once a year	This course covers the main theory and empirical evidence in urban economics at the graduate level, focusing on the development of this field during the past three decades. The prerequisites are Advanced Microeconomics, Dynamic optimization, and Applied econometrics. Topics covered include internal structure of cities, optimal city size and city size distribution, theory and empirical evidence on agglomeration economies, urban growth, urban labour markets, housing economics and policy, transportation economics, local public finance, new economic geography, and recent studies on Chinese cities.	MA/PHD	XMU	Xiaofang Dong	No

* Students have to choose three courses among the compulsory one