

MASTER in QUANTITATIVE ECONOMICS

FIRST YEAR OF THE MASTER PROGRAM

Compendium of the syllabus Academic Year: 2019-2020

Summary of the program

	Course load	ECTS
Semester 1, Up-grade courses (6 ECTS)		
Mathematics and optimization	15	3
Statistics and probability	15	3
Semester 1 (24 ECTS)		
Microeconomics 1	36	6
Macroeconomics 1	36	6
Econometrics 1 (Macro-econometrics)	36	6
Game Theory	36	6
Master 1, Semester 2		
Mandatory courses (27 ECTS)		
Microeconomics 2: Public Economics	36	6
Industrial Organization	36	6
Macroeconomics 2	36	6
Econometrics 2 (Micro-econometrics)	36	6
Database and Stata programming	18	3
Optional courses (choose 1, 3 ECTS)		
Public policy	21	3
Advanced Industrial Organization	21	3
Macroeconomic policy	21	3
International Trade: Theory and Policy	21	3

Semester 1, up-grade courses (Early September)

Statistics and probability

Teacher: Eric Bonsang, University Paris-Dauphine, LEDa & PSL

Course load: 15h, 5 sessions (3 hours per session)

ECTS: 3

Status: Mandatory

Overview

The course will first review the fundamentals of probability, followed by the fundamentals of mathematical statistics beginning with the properties of random samples and statistical inference involving estimation and hypothesis testing. The course will also introduce the simple regression model.

Prerequisites

The course is taught for students who do not have a strong background in statistics and econometrics. However, knowledge of basic mathematical tools is necessary to follow the course.

Course Objectives

The objective of the course is to provide students the fundamental techniques of statistics which are necessary to command for subsequent courses in Econometrics.

After having attended the classes, the students are expected to understand:

- The concept of random variables and their probability distributions
- The concept of random sampling, the finite sample and asymptotic properties of estimators
- The basics of hypothesis testing
- The definition and the properties of the simple regression model

Mathematics and optimization

Teacher: Jean-Philippe Lefort, University Paris-Dauphine, LEDa & PSL

Course load: 15h, 5 sessions (3 hours per session)

ECTS: 3

Status: Mandatory

Overview:

The up-grade course in Mathematics and Optimization will cover the following topics: Solving of differential equations, linear algebra, static optimizing problems (including the resolution of the Lagrange and nonlinear programming problems) and dynamic optimizing problems (Hamiltonian, maximum principle).

Prerequisites

The course is taught for students who do not have a strong background in mathematics and optimization. However, knowledge of basic mathematical tools is necessary to follow the course.

Course Objectives:

The objective of the course is to provide students with both an understanding and some practice of the core techniques in mathematics, which are necessary to master for subsequent core and specialization courses of the Master's program.

After attending the classes, the students will master the main tools of mathematics and optimization used in economics and have strengthened their analytical ability. They will be well-equipped to continue in the Master's program as all core economics and econometrics courses assume a deep prior knowledge of calculus techniques, matrix algebra, and constrained optimization.

Semester 1, September to December

Econometrics I

Teacher: To be announced

Course load: 36, 12 sessions, 3 hours per session

ECTS: 6

Status: Mandatory

Overview:

This course will provide the fundamental tools in macroeconometrics. It starts providing the basic knowledge on the modelling of univariate time series. We will present several statistical tests used to uncover their features and the main models used to represent their behaviours. The course will also introduce to forecasting. We will then present the modelling of multivariate time series with VAR models. We will then give an introduction of the structural analysis which can be run through VAR models.

Prerequisites

Statistics, econometrics (undergraduate level)

Course Objectives:

The objective of the course is to provide the student with the solid theoretical and practical knowledge of the methods used to analyse and model times series data. Practical skills will be acquired through the modelling of economic time series with econometric software (gretl, matlab). After having attended the classes, the students will master the main tools of the modeling of time series and be able to run an empirical work by themselves.

Game Theory

Teacher: Marion Oury, University Paris-Dauphine, LEDa & PSL

Course load: 36 (12 sessions of 3h)

ECTS: 6

Status: Mandatory

Overview

The content of the course can be divided in two parts. First, we will study strategic games in a static context: Pure and mixed strategy Nash Equilibrium, correlated equilibrium; Definition of a Bayesian game, Bayesian Nash equilibrium; Dominant/-dominated strategies and rationalizability. Second, we will study the multistage games: Subgame perfect equilibrium; Repeated games; Perfect Bayesian equilibrium.

Prerequisites

Fundamental notions in mathematics and optimization

Course Objectives

The objective of the course is to give some fundamental background in interactive decision making and its applications. After having attended the classes, the students will be able to understand the basic tools of game theory and the importance of this field in economics and finance.

Macroeconomics I

Teacher: Anne Epaulard (University Paris-Dauphine, LEDa & PSL) and Lise Patureau (University Paris-Dauphine, Leda & PSL)

Course load: 36 (12 sessions of 3h)

ECTS: 6

Status: Mandatory

Overview:

The course is organized in two parts.

Growth models: After presenting the stylized facts about long run economic growth, the course will first present the neoclassical growth model (Solow and Ramsey). We will then uncover the endogenous growth models: Models with externalities (Paul Romer, 1986), the role of research and development and human capital (Romer, 1990), and the creation/ destruction model (Aghion & Howitt, 1992).

Business cycles: After presenting the stylized facts about the business cycle, the course will study the canonical real business cycle model. The role of price and wage rigidities in accounting for business cycles will be discussed by analyzing the New Keynesian Phillips curve model.

Prerequisites

Mathematics and optimization

Course Objectives:

The course will provide students with sound knowledge and understanding of the basis of modern macroeconomic theory regarding (i) long run economic growth and (ii) business cycles. After attending the classes, the students will master the fundamental models of modern macroeconomics in view of analysing the key issues relative to economic growth in the long run. They will also get familiar with the modelling of business cycles fluctuations to explore the role of stabilization policies.

Microeconomics I

Teacher : Maria Luisa Ratto (Université Paris-Dauphine, LEDa & PSL)

Course load: 36 (12 sessions of 3h)

ECTS: 6

Status: Mandatory

Prerequisites

Mathematics & optimization (linear algebra and optimization problems)

Overview

This is an advanced microeconomics course. It will provide a formalized exposition of the optimal consumption and production decisions by consumers and firms, which determine the allocation of scarce resources. It will focus on a competitive economy, where agents are assumed to be price takers. The analysis will provide an understanding of how prices are determined by the interaction of the decisions of consumers and firms. The concepts and techniques developed in the course can be used to examine the behaviour of individuals in other economies, e.g. where the intervention of the state is required or in economies with other institutional frameworks (different market or informational structures), as it will be considered in the microeconomics course in the second semester.

Course Objectives

The objective of the course is to provide a comprehensive exposition of modern economic theory on the way consumers and firms make their consumption and production decisions in a competitive economy and on how prices are determined in the market (partial equilibrium). The strong interactions between markets will then be taken into account in the analysis of general equilibrium. Beginning at an intermediate level, the course will present a more formalized exposition of the concepts, preparing students for a more advanced doctoral course. Students will be provided an intuitive understanding of the economic content of the models, and of their purpose and nature, as well as a clear account of the mathematics involved.

Semester 2, January to May

Macroeconomics 2

Teacher: To be announced

Course load: 36, 12 sessions, 3 hours per session

ECTS: 6

Status: Mandatory

Overview:

The course investigates monetary policy issues in two different contexts. First, in the follow-up of Macroeconomics I, we will study how to extend the NKPC model to nominal wage rigidity and unemployment issue. A second topics is devoted to the modelling of credit market frictions in the canonical model through the financial accelerator models.

Prerequisites

Macroeconomics 1, Mathematics and optimization; Statistics and Probability, Econometrics 1

Course Objectives:

The objective of the course is to deepen the modelling of the determinants of short-run fluctuations, by putting emphasis on the role of labour market frictions and financial frictions, and to study the relevant implications for monetary policy. After attending the classes, the students will have acquired a deep understanding of the workhorse New Keynesian model and how it can be used to tackle issues related to unemployment and financial frictions.

Microeconomics 2: Public Economics

Teacher: Gabrielle Fack (Université Paris-Dauphine, LEDa & PSL) and Sidartha Gordon (Université Paris-Dauphine, LEDa & PSL)

Course load: 36 hours, 12 sessions, 3 hours each

ECTS: 6

Status: Mandatory

Overview

The aim of the course is to present the basic principles of public economics, showing the link between theoretical analysis and public policy applications in practice. The course will provide:

- An overview the main tools of public economic analysis,
- A presentation of the main market failures and a discussion of government intervention,
- An introduction to taxation
- A presentation of social insurance and redistribution programs

Theoretical concepts will be presented along with empirical evidence. Particular emphasis will be put on the recent empirical advances in public policy analysis.

Prerequisites

Microeconomics 1, Statistics and probability, basic knowledge in econometrics

Course Objectives:

After having attended the class, the students should master the analytical tools and empirical methods to analyze the main market failures and the policies implemented to address them. They should also understand the fundamental trade-off between redistribution and efficiency and the challenges posed by the design of a tax/benefit system.

Industrial organization

Teacher: Anna Creti (University Paris-Dauphine, LEDa & PSL) & Jérôme Mathis (University Paris-Dauphine, LEDa & PSL)

Course load: 36 hours, 12 sessions, 3 hours each

ECTS: 6

Status: Mandatory

Overview

The course will analyse the following topics:

1. Static models of oligopoly
2. Quality and product differentiation
3. Tacit collusion

4. Asymmetric information (Static competition, Communication, Limit pricing)
5. Competition and Investment
6. Welfare Standards in Competition Policy

Prerequisites

Microeconomics 1; Game Theory

Course Objectives:

The objective of the course is to provide a presentation of modern industrial organization that blends formal models with real-world applications and derives implications for firm strategy and competition policy.

After having attended the classes, the students will understand strategies chosen by firms with market power and how such firms adapt to different market environments.

Econometrics 2

Teacher: Olivia Bertelli (University Paris-Dauphine, LEDa & PSL) and Clémentine Garrouste (University Paris-Dauphine, LEDa & PSL)

Course load: 36 hours, 12 sessions, 3 hours each

ECTS: 6

Status: Mandatory

Overview

This course studies micro-econometrics techniques based on qualitative dependent variables and panel data. Non-linear models (Probit, Logit models), as well as selection models (Tobit, Heckman selection models) will be the focus of the first part of the course. The second part will deal with micro-econometrics models for temporal data, such as auto-regressive models, random and fixed effects models, but also non-experimental techniques developed for the evaluation of public policies using panel data, such as difference-in-differences and matching on propensity score.

The main themes are presented under a theoretical perspective, accompanied by empirical applications. The theoretical analysis is systematically followed by a discussion of research papers that have applied the estimators presented in class.

Prerequisites

Statistics and Probability

Course Objectives:

The objective of the course is to allow students to acquire theoretical and applied knowledge about the range of estimators, their estimation and causal inference applicable to probability models and temporal data.

After having attended the classes, the students will master the main micro-econometrics techniques for probability models and temporal data and they will be able to critically analyze applied work that employs these types of estimators.

Database and Stata Programming

Teacher: Olivia Bertelli (University Paris-Dauphine, LEDa & PSL) and Clémentine Garrouste (University Paris-Dauphine, LEDa & PSL)

Course load: 18 hours, 12 sessions of 1.5 hours each

ECTS : 3
Status: Mandatory

Overview:

The course presents the Stata coding language for applying micro-econometrics techniques. In the first part of the course, the main Stata features are explained by focusing on the estimation of econometric models with qualitative variables and selection models. In the second part of the course, students will learn how to analyse temporal and panel data with Stata and how to estimate temporal models, such as random effects, fixed effects and double differences. Moreover, the course will provide students with the appropriate knowledge for reproducing their econometric analyses in a professional format.

Prerequisites

Statistics and Probability

Course Objectives:

The main objective of this course is to provide students with Stata coding skills for describing and analysing cross-sectional and panel data and for estimating probability and temporal econometric models.

After having attended the classes, the students will be able to describe and analyze phenomena of interest contained in cross-sectional and panel datasets by using Stata. They will be able to conduct econometric analysis concerning probability and temporal models with graphs and tables formatted in a professional manner.

Advanced Industrial Organization

Teacher: Anna Creti (Université Paris-Dauphine, LEda & PSL)

Course load: 21 hours, 7 sessions, 3 hours each

ECTS: 3

Language: English

Status: optional

Overview

The course on Advanced Industrial Organization is the follow-up of the basic theories and models developed in the Industrial Organization class. We shall first explore the relationships among firms in the specific context of procurement and regulation. We will then introduce social regulation (economic evaluations that can be used in assessing environmental controls, health and safety). We shall then analyze dynamic aspects of competition that represent critical issues in high technology and information technology industries: innovation and persistence of market dominance, network externalities and two-sided markets.

Prerequisites

Industrial Organization, Microeconomics

Course Objectives

Students will be guided to understand both the theoretical and the empirical aspects of modern advanced Industrial Organization. In complement to the Course of Industrial Organization, this

course aims at covering most models of imperfect competition among firms to propose an analysis of various pricing strategies, marketing strategies and other strategic manipulations that characterize firms' behavior with market power.

After attending the classes, the students will have acquired a deep understanding of the advanced methods of quantitative industrial organization and game theory, to study the strategic interaction between firms and regulators, and dynamic competition models.

Public Policy

Teacher: Eve Caroli (University Paris-Dauphine, LEDa & PSL) and Brigitte Dormont (University Paris Dauphine, LEDa & PSL)

Course load: 21 hours, 7 sessions, 3 hours each

ECTS: 3

Language: English

Status: optional

Overview:

The course investigates the question of public intervention from a microeconomic viewpoint, by shedding light on two particular areas of public policy, the labor market and the health system. In a first part, we will study the stylised facts, theories and empirical analysis of labour supply, labour demand and wages.

The second part of the course will give the basics in Health Economics: Structure of a health care system, Health expenditure growth, role of ageing, demand for care and supply-induced demand, hospital regulation.

Prerequisites

Microeconomics, Undergraduate Econometrics

Course Objectives:

The objective of the course is to get students familiar with the basics of public policy intervention in two major areas: the labour market functioning and the health system organization.

After attending the course, the students will master the standard theories of labour supply and labour demand as well as the issues raised by their empirical analysis. They will also be able to analyse the effects of labour taxes and the formation of wages. They will discover how health economics mixes several fields in economics to address the main health policy questions: microeconomics, industrial organization, public economics, equity and social choice.

Macroeconomic policy

Teacher: Audrey Desbonnet (University Paris-Dauphine, LEDa & PSL) & Richard Dutu (University Paris-Dauphine, LEDa & PSL)

ECTS: 3

Language: English

Status: optional

Overview:

The course investigates the question of public intervention from a macroeconomic viewpoint, in the follow-up of Macroeconomics I. It is built in two parts. The first part of the course is an introduction to overlapping generations (OLG) model. The reduction of public debt, the

financing of social security, the taxation of capital are at the heart of the macroeconomic policy debate. The OLG model provides a convenient framework to study the effects of macroeconomic policies such as national debt or social security. The second part of the course discusses the efficiency of monetary policy both within the context of OLG models and the neo-classical Ramsey growth framework.

Prerequisites

The students must be familiar with the Solow Model and the Ramsey-Cass-Koopmans model.

Course Objectives:

The main objective of this course is to familiarize students with some key issues related to macroeconomic policy that can be addressed in the two seminal work-horse models of modern macroeconomics, the OLG model and the Ramsey model, with applications to macroeconomic policy.

After attending the classes, the students will master the two core models of modern macroeconomics and will be able to use them in view of addressing the question of the efficiency and the design of public intervention (monetary, fiscal policies, sovereign debt) from a macroeconomic viewpoint.

[International trade: Theory and Policy](#)

Teacher: Joachim Jarreau (University Paris-Dauphine, LEDa & PSL)

ECTS: 3

Language: English

Status: optional

Overview

The course will focus on the most recent theories of trade which are relevant for research on and analysis of the determinants and impacts of globalization, trade patterns, and trade policy. These theories allow to understand trade based on economies of scale and to analyse modern trade patterns (including intra-branch trade, offshoring, trade in intermediates, services trade), the gains from trade, and the use of trade policy instruments by governments. Part of the course will be devoted to empirical tests of these theories.

Prerequisites

Microeconomics (undergraduate level)

Classical theories of trade based on comparative advantage: Ricardian theory, Heckscher-Ohlin model (undergraduate course on international trade).

Course Objectives:

The objective of the course is to become familiar with the more recent theories of trade, new gains from trade, and trade policy. The course will cover models of trade of differentiated products, starting with Krugman's model and covering Melitz's model with firm heterogeneity in detail. It will also discuss alternative forms of imperfect competition (oligopolistic competition) and their consequences for trade. It will then cover political economy models of trade, which aim to explain the formation of trade policy as a result of divergent domestic interests. Finally, we will study how trade costs impact the level of trade, using the gravity model and studying its theoretical foundations and the empirical methods to estimate it.

After having attended the classes, the students will be able to assess the determinants of trade between similar countries, the impact of trade on entry and exit of firms and on aggregate

productivity. They will also be able to analyze the determinants of trade policy. They will be able to understand recent research articles on these topics.