*Année universitaire 2025/2026*

# Quantitative Economics - 1re année de Master

**Responsable pédagogique :** Olivia **BERTELLI** - https://dauphine.psl.eu/recherche/cvtheque/bertelli-olivia

**Crédits ECTS** : 60

## LES OBJECTIFS DE LA FORMATION

La première année du Master Quantitative Economics offre une formation solide axée sur les fondamentaux de l'économie théorique et appliquée. Elle permettra d'étudier une variété de thématiques en macroéconomie, microéconomie et organisation industrielle, avec un accent particulier sur la modélisation des décisions économiques et des interactions entre les acteurs économiques. Les étudiantes et les étudiants en exploreront également l'application à des enjeux majeurs de politique économique, tels que les politiques de santé, la pauvreté et le développement, ou encore le changement climatique. Des enseignements en macroéconométrie, microéconométrie et data management leurs permettront de se familiariser avec le traitement et l'analyse des données. L'utilisation d'exemples empiriques les aidera à développer leurs compétences en codage à l'aide d'outils logiciels couramment utilisés en économie, tels que R, MATLAB et Stata.

**Les objectifs de la formation :**

- Maîtriser les concepts fondamentaux en économie (macroéconomie, microéconomie, théorie des jeux, organisation industrielle, etc.).
- Apprendre à modéliser et résoudre des problèmes économiques complexes, les appliquer à divers enjeux (santé, éducation, développement, commerce, etc.) et évaluer de manière critique les politiques économiques.
- Savoir traiter et analyser les données pour réaliser des analyses empiriques fiables et professionnelles.
- Acquérir des connaissances sur les recherches les plus récentes en économie et comprendre les processus de décision des acteurs publics et privés.
- Communiquer les résultats d'analyses économiques, statistiques et/ou économétriques à différents publics, aussi bien à l'oral qu'à l'écrit.

## MODALITÉS D'ENSEIGNEMENT

Tous les cours de la première année de Master sont dispensés en anglais et pour l'essentiel, sous forme de cours magistraux. Pour les enseignements en économétrie et data management, une partie des séances est consacrée à la correction d'exercices et/ou au traitement de données en petits groupes. Le premier semestre débute début septembre par une formation de remise à niveau de 10 jours portant sur les outils statistiques et la programmation sous Matlab. Il se poursuit ensuite sur 12 semaines avec des cours fondamentaux en économie (Economics of growth , Microeconomics theory, Game theory) ainsi que deux cours centrés sur le traitement et l'analyse des données (Macroeconometrics, Data Management and programming). Les étudiants sont initiés aux logiciels Matlab, Dynare et R. Tous les cours sont obligatoires et représentent 30 crédits ECTS. Les cours et les examens finaux se terminent en décembre de l'année universitaire. Le second semestre approfondit les enseignements du premier, tout en préparant le choix de spécialisation de parcours en seconde année de Master. Vous aurez à choisir entre deux blocs de spécialisation, « Economics track » ou « Data track » Si les étudiants choisissent le **track « Economics »** Sur le plan théorique, il s'agit d'intégrer les défaillances de marché et les frictions dans l'analyse économique (Public economics, Industrial Organization). Sur le plan des méthodes quantitatives, l'enseignement se concentre sur les techniques d'analyse de données individuelles et qualitatives (Applied microeconometrics, Microeconometrics : data applications). En plus des cours obligatoires, les étudiants pourront choisir deux cours optionnels parmi cinq proposés, selon leurs thématiques d'intérêt en économie. Sous réserve de validation des cours du bloc « Economics » (ainsi que des cours du semestre 1), ils auront validé l'ensemble des cours proposés par le certificat AQME offerts au niveau Master 1. Si les étudiants choisissent le **track « Data »** Sur le plan théorique, il s'agit d'analyser les structures et organisation des marchés au travers de deux cours dédiés (Industrial Organization, Topics in Advanced Industrial Organization). En parallèle, ils approfondiront leurs compétences en méthodes numériques et programmatiques de traitement des données. Ils compléteront ces cours obligatoires par deux cours optionnels parmi trois en économie. De manière commune aux deux blocs, l'enseignement « Topics in advanced economic analysis » vise également à sensibiliser les étudiants à l'apport de la recherche économique dans la compréhension de certains enjeux contemporains majeurs, au cœur des débats économiques et politiques. Chaque étudiant doit valider 30 crédits ECTS à la fin du semestre. Les cours s'étendent sur 12 semaines, de janvier à avril, et les examens ont lieu début mai. Les étudiants sont ensuite fortement encouragés à effectuer un stage, bien que celui-ci ne donne pas lieu à des crédits ECTS.

## ADMISSIONS

Les candidats doivent être titulaires d'une licence (diplôme équivalent à 180 ECTS) délivrée par une université, ou d'un diplôme d'un IEP (Institut d'Études Politiques), d'une Grande École ou d'un Grand Établissement reconnu comme équivalent, en France ou à l'étranger. Il est préférable, mais non obligatoire, que les étudiantes et les étudiants disposent d'une formation académique solide en méthodes quantitatives, idéalement dans l'un des domaines suivants : économie, statistiques, mathématiques appliquées à l'économie, ou informatique appliquée à l'économie. Une excellente maîtrise de l'anglais est exigée. Pour les étudiants issus d'une université de l'Union européenne, la maitrise de l'anglais doit être attestée par l'un des résultats de test suivants, datant de moins de trois ans :

- **TOEFL iBT** (score minimum : 90)
- **IELTS** (score minimum : 6,5)
- **Cambridge Certificate** (niveau C1)
- **GRE** (scores minimum de 160 en sections verbale et quantitative)

Pour les étudiants ayant effectué la majeure partie de leurs études en dehors de l'UE, l'attestation doit inclure à la fois :

- un score **GRE** (minimum 160 en verbal et en quantitatif)
- un test de langue attestant du niveau d'anglais, tel que le**TOEFL iBT** (minimum 90), **IELTS** (minimum 6,5) ou **Cambridge Certificate** (niveau C1),
- chacune des pièces doit dater de moins de trois ans.

Les candidats dont la langue maternelle est l'anglais ou qui ont effectué au moins une année d'études en anglais dans un pays anglophone au cours des deux dernières années, et validé les examens correspondants, sont dispensés de ces tests.

# PROGRAMME DE LA FORMATION

- Semester 1
  - Research Track - AQME Certificate courses (Graduate Program in Economy) - 9 ECTS
    - Introduction to Matlab programming
    - Data Management and Programming
    - Macroeconometrics
  - Mandatory courses - 21 ECTS
    - Economics of growth
    - Game theory
    - Microeconomic theory
    - Upgrade in statistical tools
- Semester 2
  - Research Track - AQME Certificate courses (Graduate Program in Economy - 9 ECTS
    - Applied Microeconometrics
    - Microeconometrics : data applications
  - Mandatory courses - 12 ECTS
    - Public economics
    - Industrial Organization
  - Electives - 6 ECTS - Choose 2
    - Population Economics
    - Topics in Advanced Industrial Organisation
    - Measurement issues with applications to GDP, poverty and inequality
    - Business cycles analysis
  - Open your mind - 3 ECTS
    - Topics in advanced economic analysis
  - Mandatory courses - 21 ECTS
    - Industrial Organization
    - Optimization and numerical methods
    - Topics in Advanced Industrial Organisation
    - Programming and web data collection
    - Unsupervised learning

- Open your mind - 3 ECTS
  - Topics in advanced economic analysis
- Electives - Choose for 6 ECTS
  - Population Economics
  - Business cycles analysis
  - Applied Microeconometrics

## DESCRIPTION DE CHAQUE ENSEIGNEMENT

**SEMESTER 1**

**Research Track - AQME Certificate courses (Graduate Program in Economy) - 9 ECTS**

# Introduction to Matlab programming

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

This introductory MATLAB course provides students with a practical foundation in numerical programming for economics and quantitative analysis. Structured over four sessions, the course covers the MATLAB environment, basic programming syntax, arithmetic operations, vectors and matrices, random number generation, data import and export, graphical visualization in two and three dimensions, conditional statements and loops, as well as the creation of user-defined functions and an introduction to optimization methods. The course combines conceptual explanations with hands-on exercises designed to help students build confidence in coding and problem-solving. Assessment is based on a project completed partly in class and finalized independently within a limited take-home period.

**Compétences à acquérir :**

By the end of the course, students are able to write and organize MATLAB scripts, manipulate vectors, matrices, and arrays, visualize data clearly through plots, import and manage datasets, create reusable functions, and apply basic optimization tools to numerical problems. More broadly, the course develops programming autonomy, analytical rigor, and the ability to use MATLAB as a tool for empirical analysis, quantitative modeling, and applied research in economics and related fields.

# Data Management and Programming

**ECTS** : 3

**Enseignant responsable** : FABRICE **ROSSI** (https://www.ceremade.dauphine.fr/en/members/detail-cv/profile/fabrice-rossi.html)

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

This course provides an introduction to programming and to data management, with a data- oriented point of view. The course contains two parts. The data management part introduces the data life cycle in data oriented projects from data collection to data exploration. While the main focus of the course is tabular data, it contains also an introduction to entity-relationship models and to relational databases. The programming part of the course introduces the fundamental aspects of imperative programming and the use of the main R data structures. The two aspects of the course are tightly integrated: each aspect of data management is illustrated by adapted programming constructs and uses specific data structures from R. In addition, an introduction to reproducible research is provided, using active documents (in quarto) and git.

**Compétences à acquérir :**

The first objective of the course is to introduce students to data-driven projects, by presenting the first steps of such projects from data collection to data exploration. Acknowledging the strong limitations of integrated software that rely solely (or mostly) on graphical user interfaces, the second major objective of the course is to provide all the programming knowledge and tools needed to implement all those data management steps, relying on the R language.

After having attended the classes, the students will be able to:

- specify a data management chain adapted to a data-driven project;
- identify the potential data value increase at the different steps of the chain;
- implement those steps in R: data cleaning, data storage, data aggregation and other requests, data exploration;
- more generally implement non-obvious data manipulation schemes in R;
- write active documents using quarto;
- use git and github at a basic level.

**Pré-requis recommandés**

Most of the course is self-contained but the students are expected to be familiar with all the mathematical tools associated

to an economics curriculum: Linear algebra, calculus, continuous optimization, probability and statistics, all at an undergraduate level. A significant part of the examples of data manipulation from the course will make use of this mathematical knowledge. However, the course should be accessible even with only a cursory knowledge of most of the listed concepts.

**Mode de contrôle des connaissances :**

The final grade will be made of two types of grading: A continuous assessment grade, made mostly of grades obtained to quizzes (approximately 50 % of the grade) and integrating oral participation during the class and regular attendance; A grade obtained on a full data-oriented project from data collection to data exploration (preferably done in groups of 2 students).

**Coefficient** : 1 (Pour le M1 Affaires Internationales et Développement)
1 (Pour le M1 Quantitative Economics)

**Bibliographie, lectures recommandées :**

R for data science: https://r4ds.hadley.nz/

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# Macroeconometrics

**ECTS** : 6

**Enseignant responsable** : MATTEO **MOGLIANI**

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

This course will provide the fundamental tools in macroeconometrics. It starts providing the basic knowledge on the modelling of univariate time series, the concept of stationarity, the main tools to represent a univariate time series. Then, it will show some extensions to this basic framework (time varying parameters, selection of variables…). The course will also introduce to forecasting. We will then present the modelling of multivariate time series with VAR models, explain how structural VAR analysis is the natural set up to depart from a purely statistical description and provide economic interpretation. Finally, different extensions to this set up will be introduced: time-varying parameters, co-integration, expectations ….

**Compétences à acquérir :**

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 time series data. Practical skills will be acquired through the modelling of economic time series with econometric software (practical sessions under Matlab). After having attended the classes, the students will master the main tools of time series' modelling and be able to run an empirical work by themselves.

**Pré-requis recommandés**

statistics, general mathematical background

**Mode de contrôle des connaissances :**

Final Exam (50%) + Final Project in pairs (40%) + Participation (10%)

**Coefficient** : 1

**Bibliographie, lectures recommandées :**

Hamilton, J.D. (1994). Time Series Analysis, Princeton University Press. Johnston, J. and J.E. DiNardo (2007), Econometric Methods, Mac Graw-Hill Econometric series.

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**Mandatory courses - 21 ECTS**

# Economics of growth

**ECTS** : 6

**Enseignant responsable** : ANNE **EPAULARD** (https://dauphine.psl.eu/recherche/cvtheque/epaulard-anne)

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

The course will cover the following topics.

1. Stylized facts about long run growth – Growth decomposition and the Solow residual
2. The impact of growth on economic welfare
3. The Solow model and conditional economic convergence
4. The Ramsey model
5. Externalities and the AK growth model; the role for tax and subsidies policy
6. R&D, innovation and growth (Romer (1990) model)
7. Growth in creation / destruction models (Aghion – Howitt model)
8. Growth with directed technical change
9. Sustainable growth and energy transition analysis
10. Economic growth and declining population
11. Economic growth with IA

**Compétences à acquérir :**

The course will provide students with sound knowledge and understanding of the basis of modern macroeconomic theory regarding long run economic growth. After attending the classes, the students will master the fundamental models of modern macroeconomics in view of analysing the key issues and policies relative to long run economic growth.

**Pré-requis recommandés**

Mathematics & optimisation

**Mode de contrôle des connaissances :**

60% of the final grade is based on a final exam (closed book exam).

40% is based on regular short quizzes.

Participation in class will be considered as bonus over this grade.

**Coefficient** : 1

**Bibliographie, lectures recommandées :**

Reference book: Aghion, Philippe and Howitt, Peter “The Economic of Growth”, MIT Press 2008


- Daron Acemoglu, 2002. “Directed Technical Change.” Review of Economic Studies 69(4): 781–809.
- Daron Acemoglu, Philippe Aghion, Leonardo Bursztyn, and David Hemous, 2012,”The Environment and Directed Technical Chang”, American Economic Review 2012, 102(1): 131–166
- Charles I. Jones and Peter J. Klenow (2016) "Beyond GDP? Welfare across Countries and Time", American Economic Review, 2016, 106(9): 2426-2457
- Charles Jones (2022) “The end of economic growth? Unintended consequences of a declining population, American Economic Review, 2022, 112(11): 3489-3527


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# Game theory

**ECTS** : 6

**Enseignant responsable** : DAVID **ETTINGER** (https://dauphine.psl.eu/recherche/cvtheque/ettinger-david)

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

**Chapter 1: Normal form games:** pure and mixed strategy Nash equilibrium; weakly/strictly dominated strategies , iterated elimination of dominated strategies.

**Chapter 2: Dynamic games:** Backward induction, subgame perfect Nash equilibrium, repeated games.

**Chapter 3: Incomplete information (in static games):** Bayesian Nash equilibrium; introduction to some applications (auctions, finance...)

**Compétences à acquérir :**

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.

**Pré-requis obligatoires**

The student must be at ease with some basic mathematical notions such as: derivations, first-order conditions...

**Mode de contrôle des connaissances :**

A mid-term exam and a final exam

**Coefficient** : 1

# Microeconomic theory

**ECTS** : 6

**Enseignant responsable** : CLAIRE **RIMBAUD** (https://sites.google.com/view/claire-rimbaud/home)

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

The course focuses 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 interactions between markets will also be studied (general equilibrium). It will cover some concepts of welfare economics (e.g., Pareto efficiency), publics economics (e.g. externalities, public goods) and decision theory (e.g., GARP).

**Compétences à acquérir :**

The objective of the course is to provide an overview of topics in advanced microeconomic theory, beyond what has been studied in undergraduate courses.

**Coefficient** : 1

**Bibliographie, lectures recommandées :**

G. A. Jehle and P. J. Reny, Advanced Microeconomic Theory

A. Mas-Colell, M. Whinston and G. Green, Microeconomic Theory

H. Varian, Microeconomics Analysis

+ Articles cited in class.

# Upgrade in statistical tools

**ECTS** : 3

**Enseignant responsable** : ERIC **BONSANG** (https://dauphine.psl.eu/recherche/cvtheque/bonsang-eric)

**Langue du cours** : Français

**SEMESTER 2**

**Research Track - AQME Certificate courses (Graduate Program in Economy - 9 ECTS**

# Applied Microeconometrics

**ECTS** : 6

**Enseignants** : Olivia **BERTELLI**, ERIC **BONSANG**
https://dauphine.psl.eu/recherche/cvtheque/bertelli-olivia
https://dauphine.psl.eu/recherche/cvtheque/bonsang-eric

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

This course focuses on micro-econometrics techniques based on temporal data (cross-sectional and panel) and qualitative dependent variables. The first part will explore possible sources of OLS bias and discuss techniques and estimators to address those biases ( micro-econometrics techniques for temporal data, such as first difference, random effects, fixed effects and difference-in-differences estimators). Non-linear models (Probit, Logit models), as well as selection models (Tobit, Heckman selection models) will be the focus of the second part of the course, as well as the instrumental variable estimator. The main themes are presented under a theoretical perspective, accompanied by empirical applications on Stata.

**Compétences à acquérir :**

At the end of the course 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.

**Pré-requis obligatoires**

Statistics and Probability, statistical inference, hypothesis testing, OLS with multiple variables

**Mode de contrôle des connaissances :**

Students will be evaluated in two steps. They will present in pairs a scientific paper among a list provided by the teacher. This will be the same paper to be replicated for the Database and Stata Programming course. The presentation will count for 30% of the final note. The rest of the note will be based on a final written exam scheduled in the exams' week.

**Coefficient** : 1

**Bibliographie, lectures recommandées :**

List of scientific papers for students' presentations will be provided at the beginning of the course. Selected chapters from:

1. Wooldridge, J. (2002) "Econometric analysis of cross-section and panel data", MIT Press, Cambridge.
2. A. Colin Cameron and Pravin K. Trivedi (2005), "Microeconometrics: Methods and Applications", Cambridge University Press

All slides, datasets, papers and other materials will be available on the MyCourse webpage.

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# Microeconometrics : data applications

**ECTS** : 3

**Enseignant responsable** : Olivia **BERTELLI** (https://dauphine.psl.eu/recherche/cvtheque/bertelli-olivia)

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

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.

**Compétences à acquérir :**

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.

**Pré-requis recommandés**

Statistics and Probability, statistical inference, hypothesis testing, OLS with multiple variables

**Mode de contrôle des connaissances :**

Critical analysis and replication of a research paper's results in a short dissertation format.

**Bibliographie, lectures recommandées :**

1. Cameron, Adrian Colin, and Pravin K. Trivedi. Microeconometrics using stata. Vol. 2. College Station, TX: Stata press, 2010.

2. Gentzkow and Shapiro (2014) "Code and Data for the Social Sciences: A Practitioner's Guide."

Internet resources:

1. Stata video tutorials: https://www.stata.com/links/video-tutorials/

2. UCLA tips: http://www.ats.ucla.edu/stata/

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# Public economics

**ECTS** : 6

**Enseignant responsable** : SIDARTHA **GORDON** (https://dauphine.psl.eu/recherche/cvtheque/gordon-sidartha)

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

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.

**Compétences à acquérir :**

After having attended the classes, 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.

**Pré-requis recommandés**

Microeconomics, Econometrics

**Coefficient** : 1

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# Industrial Organization

**ECTS** : 6

**Enseignant responsable** : JEROME **MATHIS** (https://www.jeromemathis.fr/aio)

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

This industrial organization course aims to present formal models and practical applications to analyze business strategies and competition policies. It covers topics such as oligopolies, product differentiation, tacit collusion, information asymmetry, investment in R&D and welfare standards in competition policy. The goal is to understand the strategies of firms with market power, how they adapt to different market structures, and the role of competition authorities. The skills targeted include microeconomic modeling, solving formal games, and interpreting economic outcomes.

**Compétences à acquérir :**

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

**Pré-requis obligatoires**

Microeconomics and Game theory.

**Mode de contrôle des connaissances :**

Final exam.

**Coefficient** : 1

**Bibliographie, lectures recommandées :**

Cf website.

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**Electives - 6 ECTS - Choose 2**

# Population Economics

**ECTS** : 3

**Enseignant responsable** : Julien **BERGEOT** (https://dauphine.psl.eu/recherche/cvtheque/bergeot-julien)

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

Population economics applies an economic perspective to demography or the analysis of human populations. This course will provide an introduction to selected fields and research areas that are relevant for the economic analysis of populations, incl. family economics, migration economics, health economics and the economics of ageing. We will discuss theoretical models that help to explain, e.g., the relevance of economic factors for marriage and divorce, how income and education affect the number of children born in a family and investment in these children, or how pension policies affect younger generations. We will consider relevant empirical studies that test hypotheses derived from these models and discuss how economic insights might help to address some of the major challenges of the 21st century, such as population growth in low-income countries, international migration and population ageing in high-income countries.

**Schedule:**

1 Family Economics: Partnership formation and dissolution, intrahousehold decision-making

2 Family Economics: Fertility, Intergenerational links

3 Economics of migration: Determinants of migration, internal and international migration, characteristics of migrants

4 Economics of migration: Migrant's health, family and labour market outcomes

5 Health Economics: Demand for health, health production and healthcare supply

6 Health Economics: Healthcare spending and health insurance

7 Economics of ageing: Older workers, retirement and pensions

8 Economics of ageing: Healthy ageing and long-term care

**Compétences à acquérir :**

After completing the course, students will have an overview of some of the most important theories in population economics and the empirical evidence supporting or contradicting these theories. They will be able to discuss economic aspects of family formation, fertility, migration, health and ageing. Students will be able to read and critically assess empirical papers on these topics. The course will provide students with the required background for a specialization in health economics, family economics or the economics of ageing for the Master 2 or a Master thesis project in these research areas.

**Pré-requis obligatoires**

None.

**Mode de contrôle des connaissances :**

- Presentation of a research paper (30% of the final grade)

- Written final exam (70% of the final grade)

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# Topics in Advanced Industrial Organisation

**ECTS** : 3

**Enseignant responsable** : ANNA **CRETI** (https://dauphine.psl.eu/recherche/cvtheque/creti-anna)

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

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 the 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. 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 when they try to gain or maintain market power.

**Compétences à acquérir :**

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.

**Mode de contrôle des connaissances :**

0.5

**Bibliographie, lectures recommandées :**

Economics of Regulation and Antitrust, Viscusi, Vernon Harrington. The Theory of Industrial Organization, Tirole.

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# Measurement issues with applications to GDP, poverty and inequality

**ECTS** : 3

**Enseignant responsable** : GABRIELLE **FACK** (https://dauphine.psl.eu/recherche/cvtheque/fack-gabrielle)

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

Is GDP a suitable measure of economic and social progress? What makes a distribution of income more or less equal? How to quantify environmental damages?

This course aims at addressing these questions. It is a methodological course that discusses the measurement of economic and social outcomes. Policies are often designed based on indexes and quantitative objectives, while defining those indexes and outcomes is not always straightforward. In this course, we will discuss both the theoretical and empirical aspects of how to construct outcome variables: how are the conceptual choices made in terms of what is included or excluded from the computation of an indicator, and how each component is valued? Which data are used and do they allow to observe the entire phenomenon we want to measure? How do we translate the theoretical concepts into the data?

An introductory session will focus on what to be measured and how to measure it. In particular, it will discuss what the potential biases introduced by data choices (what is the source of the data, the size and representativeness of the sample, etc.). It will be followed by topic sessions on GDP, inequality, employment and unemployment, education, and the measurement of phenomenon that cannot be directly observed.

**Compétences à acquérir :**

This course will allow students to have a critical eye on how socioeconomic indicators are built. It will provide them with some statistical tools regarding the measurement of phenomenon and cover more specific measurement issues in a range of economic and social dimensions. This reflection will allow students to better understand some of the controversial questions that are discussed in the public debate, and to themselves build social and economic indicators.

This class will be useful to all students, and in particular those who intend to do a PhD dissertation in economics using empirical data, as well as students who plan to work in institutions that produce economic statistics, studies and policy recommendations.

**Pré-requis recommandés**

Statistics (Basic level)

Graduate Econometrics (M1 mandatory course)

**Mode de contrôle des connaissances :**

Assessment will be based on a presentation (35%), a final exam (60%) and participation in class (5%).

**Bibliographie, lectures recommandées :**

A specific reading list with articles provided for each lecture

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# Business cycles analysis

**ECTS** : 3

**Enseignant responsable** : LISE **PATUREAU** (https://dauphine.psl.eu/recherche/cvtheque/patureau-lise)

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

After presenting the stylized facts about the business cycle, the course will study the canonical real business cycle model that focuses on the role of technological shocks as determinant of macroeconomic fluctuations. We will then consider the role of monetary policy. After presenting some empirical evidence on the role of money, we will study the classical monetary model. The third part of the course is dedicated to the basic new Keynesian model with monopolistic competition and nominal price rigidities. Within this framework, we will study the role of technological shocks as well as monetary policy shock and discuss their empirical relevance regarding business cycles features.

**Compétences à acquérir :**

The course will provide students with sound knowledge and understanding of the basis of modern macroeconomic theory of business cycles. After attending the classes, the students will master the fundamental RBC and New Keynesian models of business cycles. They will get familiar with the modelling of price rigidities to explore the role of monetary policy within New Keynesian models analytically as well as to assess their quantitative predictions in terms of business cycles features.

**Pré-requis obligatoires**

Microeconomics at the undergraduate level, good knowledge of optimization tools

**Pré-requis recommandés**

Macroeconometrics, Economics of growth

**Mode de contrôle des connaissances :**

The final grade will be based on two grades: a mid-term grade (30%) and a final exam grade (70%).

The final grade is based on a final written exam (closed-book exam).

The mid-term grade is made on the average grade that each student obtains to 4 quizzes. Quizzes will be given each session, at the beginning of the class, during 10 minutes, except for the first session (no quiz). They aim to check that the content of the previous session has been understood. Quizzes will be randomly corrected (not all students will have a grade each time), but each student will have 4 grades at the end of the semester.

**Bibliographie, lectures recommandées :**


- Gali, Jordi, Monetary Policy, Inflation and the Business Cycle: An Introduction to the New Keynesian Framework, Princeton University Press (2d edition)
- King, R., Plosser, C. & Rebelo, S. “Production, Growth and Business Cycles", Journal of Monetary Economics, 1988, vol. 21, pp. 195-232.
- Gali, J, “Technology, Employment and the Business Cycle: Do Technology Shocks explain aggregate fluctuations?" The American Economic Review, 1999, vol. 89, n.1, pp. 249-271


Other references will be provided along the course.

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**Open your mind - 3 ECTS**

# Topics in advanced economic analysis

**ECTS** : 3

**Enseignant responsable** : Olivia **BERTELLI** (https://dauphine.psl.eu/recherche/cvtheque/bertelli-olivia)

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

The very large efforts carried out by countries and international organizations to increase income and fight poverty have been unequally successful. While some countries have seen impressive growth in the last 30 years, 736 million people still live in extreme poverty, one child out of three is undernourished and lacks access to drinking water. Famines and conflicts keep rising around the globe, undermining human and economic development.

How to fight poverty and inequality? How to improve the life conditions of millions of people? This course looks at major public policies and interventions that tackled poverty in developing countries in the past twenty years. After discussing the main concepts and tools to measure poverty, inequality and human development, we will go deep in analysing actions taken around the world to improve people’s lives. The course focuses on impact evaluations of public policies tackling the constraints to human and economic development tied to education, health, gender and agriculture in developing countries. It provides insights into social policies in developing countries, with a focus on the instruments and the political

economy of the implementation of policies.

**Compétences à acquérir :**

The overall objectives of this course are to provide students with an overview of policies in developing countries, with a focus on the different types of instruments and the political economy of policy implementation. It will also discuss the impacts of education, health, gender and agricultural policies in developing countries.

The course is based on selected contemporary applied research in development economics, to be read by the students and to be discussed in class. By the end of the course, the students are expected to master the main challenges related to policies in developing countries and know the most recent evolutions in this literature. They will also be able to critically assess research work.

**Pré-requis obligatoires**

The class will sometimes get technical regarding the econometric methods applied in the scientific articles. We will discuss key methods along with the articles implementing them. We expect the students to be familiar with temporal data estimation methods, 2SLS estimators and randomized controlled trials

**Mode de contrôle des connaissances :**

Group presentation and final oral exam.

**Bibliographie, lectures recommandées :**

An updated list of readings will be available on Moodle

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**Mandatory courses - 21 ECTS**

# Optimization and numerical methods

**ECTS** : 6

**Langue du cours** : Anglais

**Coefficient** : 1

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# Unsupervised learning

**ECTS** : 3

**Langue du cours** : Anglais

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# Programming and web data collection

**ECTS** : 3

**Enseignant responsable** : BRUNO **CHAVES FERREIRA**

**Langue du cours** : Anglais

**Description du contenu de l'enseignement :**

This course covers essential Python programming techniques for web data collection in applied economic analysis. Students will learn practical methods to extract structured data from online sources, starting with basics such as HTML/CSS, HTTP requests, XPath, CSS selectors, browser emulation, and public/private APIs (World Bank, INSEE, IMF).

Advanced topics include hidden APIs, overcoming technical obstacles (session management, blocking points), and large-scale data extraction. Students will gain expertise using libraries like requests, BeautifulSoup, and pandas for JSON/XML handling, data cleaning, and pipeline creation.

The course also emphasizes ethics, legal compliance, privacy, and responsible data use. Practical exercises and real-world examples will enable students to develop robust solutions for collecting and analyzing economic data from the web.

**Compétences à acquérir :**

**Course Objectives:**

- Write structured and reusable Python code for data tasks.
- Interact with APIs and process JSON/XML data structures.
- Understand HTML structure and use scraping tools like BeautifulSoup.

- Automate web data collection while following ethical standards.
- Clean, structure, and store collected data for analysis.
- Identify and navigate common technical challenges in web scraping.
- Implement browser emulation techniques for complex data collection scenarios.
- Build reproducible data pipelines to facilitate economic research and analysis.
- Evaluate legal constraints and ethical implications of web data extraction.

**Targeted competencies:**

- Develop robust Python programming skills tailored to data collection and analysis.
- Effectively utilize REST APIs and parse structured web data (JSON/XML).
- Extract data reliably from static web pages using scraping tools such as BeautifulSoup.
- Efficiently clean and transform datasets using pandas and regular expressions (regex).
- Design and document reproducible pipelines for systematic data acquisition and analysis

**Mode de contrôle des connaissances :**

The assessment will consist in written exam and an oral presentation of a project made in groups.

**Bibliographie, lectures recommandées :**

**Python and Scraping**

- https://developers.google.com/edu/python/introduction
- https://arxiv.org/abs/2211.04630
- https://realpython.com/python-web-scraping-practical-introduction

**Ethical, Legal, and Practical Considerations**

- https://arxiv.org/abs/2410.23432
- https://www.cnil.fr/fr/focus-interet-legitime-collecte-par-moissonnage
- https://www.captaincontrat.com/protection-des-creations/cgv-cgu-cga/web-scraping-est-ce-legal-me-marcotte
- https://fr.wikipedia.org/wiki/Donn%C3%A9es_ouvertes_en_France

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