MACROECONOMÍA AVANZADA II (2017-18)

DATOS GENERALES

Código 41235

Créditos ECTS 5

Departamentos y áreas

Departamento	Área	Dpt. Resp.	Dpt. Acta
FUNDAMENTOS DEL ANALISIS ECONOMICO	FUNDAMENTOS DEL ANALISIS ECONOMICO	SÍ	SÍ

Estudios en que se imparte

MÁSTER UNIVERSITARIO EN ECONOMÍA CUANTITATIVA

Contexto de la asignatura

This is a second optional course in macroeconomic theory. The other two courses are Advanced Macroeconomics I and Topics in Advanced Macroeconomics.

OBJETIVOS

Objetivos específicos aportados por el profesorado (2017-18)

This course studies computational approaches for solving dynamic economic models. It has three parts. It provides a background in computational techniques, describes numerical methods for solving dynamic economic models and shows applications from the recent literature that represent challenges to computational methods. First, we study models with a finite, large number of state variables (e.g., large scale models of international trade, new Keynesian economies) and show how to solve these models using Smolyak, ergodic-set and perturbation methods. Second, we analyze models with a continuum of state variables and show how to treat these models with Krusell-Smith and other methods. Third, we discuss applications of numerical methods to dynamic games including the models with time-inconsistency. Finally, we survey the recent development in software and hardware including GPUs, parallel computing and supercomputers. The programming languages are MATLAB, DYNARE and C.

CONTENIDOS

Contenidos teóricos y prácticos (2017-18)

INTRODUCTION

PART I. MAIN INGREDIENTS OF A GLOBAL SOLUTION METHOD FOR MACROECONOMIC MODELS

1. Model with elastic labor supply.
2. Time invariant decision functions.
3. An example of a global projection-style Euler equation method.
- Unidimensional and multidimensional grids and basis functions.
- Ill-conditioning and numerical stability.
- Numerical integration.
- Optimization methods.
- Evaluation of the accuracy of solutions.

PART II. HETEROGENEOUS AGENTS MODELS

1. Heterogeneous agents models with complete markets.
2. Generalized stochastic simulation algorithm for models with finite set of agents.
3. Heterogeneous agents models with a continuum of agents
- Aiyagari model;
- Krusell and Smith model.
4. Overlapping-generation models.

PART III. NUMERICAL METHODS FOR SOLVING STATE-DEPENDANT MACROECONOMIC MODELS WITH APPLICATIONS

1. Models with sovereign default. Envelope condition method.
2. Models with quasi-geometric discounting.
3. New Keynesian models with a zero lower bound on nominal interest rates. Epsilon distinguishable set and cluster grid algorithms.
4. Smolyak method. A multi-country model of international trade.
5. Algorithms with precomputation of integrals.

PART IV. NUMERICAL METHODS FOR SOLVING TIME-DEPENDANT MACROECONOMIC MODELS.

1. Extended path method.
2. Extended functions path method.

PART V. MACHINE LEARNING AND DEEP LEARNING IN ECONOMICS

1. Introduction to machine learning
- Supervised learning.
- Unsupervised learning.
2. Deep learning.

PART VI. HARDWARE AND SOFTWARE FOR COMPUTATIONALLY INTENSE MACROECONOMIC MODELS.

1. Parallel computations in economics.
2. Supercomputers.

EVALUACIÓN

Instrumentos y criterios de Evaluación 2017-18

The course grade will be based on individual problem sets (30%), quizzes (30%) and an individual research project (40%). The project is a short research paper in which computational methods are used to address some relevant economic questions and will present the results in class. The requirements to the project will be explained in class.

In case of failing the course, the final grade will be composed of homework grade (30%), quizzes (30%) and the new grade for the project (40%).

Tipo	Criterio	Descripción	Ponderación
ACTIVIDADES DE EVALUACIÓN DURANTE EL SEMESTRE	There will be 4-5 problem sets. We require the homework submitted individually. You are encouraged to work hard on the homework: some questions on the exams will strongly resemble homework questions.	Problem Sets	30
ACTIVIDADES DE EVALUACIÓN DURANTE EL SEMESTRE	The project is a short research paper in which computational methods are used to address some relevant economic questions and will present the results in class. The requirements to the project will be explained in class.	Research project	40
ACTIVIDADES DE EVALUACIÓN DURANTE EL SEMESTRE	There will be 2 quizzes on the material covered in class.	Quizzes	30