Content

Course Code	Course Name	Semester	Theory	Practice	Lab	Credit	ECTS
ECON428	Dynamic Macroeconomics	8	3	3	0	3	6

Prerequisites	
Admission Requirements	

Language of Instruction	French
Course Type	Elective
Course Level	Bachelor Degree
Objective	The aim of the Dynamic Macroeconomics course is to provide students with the theoretical and mathematical tools required to analyze the intertemporal optimization behavior of economic agents (households, firms, and the government) and its implications for macroeconomic equilibrium. To this end, the course applies dynamic optimization methods (calculus of variations, optimal control, dynamic programming) to core macroeconomic problems such as consumption-saving decisions, capital accumulation, growth, and business cycles; examines concepts such as equilibrium, stability, and multiplicity of equilibria; and develops and solves standard dynamic macroeconomic models, including the Solow model, the Ramsey-Cass-Koopmans model, and endogenous growth models. Ultimately, the course seeks to equip students with an analytical foundation that goes beyond static analysis, enabling them to model the time evolution of economic variables and to engage with the contemporary dynamic macroeconomics literature.
Content	1- Introduction to the calculus of variations and optimal control. 2- Study of elementary optimal dynamical systems. Problems of existence, multiplicity, and stability of equilibria. 3- Working through several examples and exercises. 4- Introduction to endogenous growth.
References	Barro, R. J., Sala-i-Martin, X. — Economic Growth, MIT Press Blanchard, O. J., Fischer, S. — Lectures on Macroeconomics, MIT Press Romer, D. — Advanced Macroeconomics, McGraw-Hill Acemoglu, D. — Introduction to Modern Economic Growth, Princeton University Press Ljungqvist, L., Sargent, T. J. — Recursive Macroeconomic Theory, MIT Press Chiang, A. C. — Elements of Dynamic Optimization, McGraw-Hill Kamien, M. I., Schwartz, N. L. — Dynamic Optimization, North-Holland (Dover yeniden basımı)

Theory Topics

Week	Weekly Contents
1	Calculate variations. 1st order necessary conditions for fixed and free terminal point.
2	Exercices.
3	The optimal order. 1st order necessary conditions for fixed and free terminal point.
4	Exercices.
5	Sufficient conditions for the given final time.
6	Sufficient conditions for infinite horizon.
7	Exercices.
8	The neoclassical optimal model.
9	A simulation of the neoclassical optimal model.
10	The optimal neoclassical model with exogenous technical progress. The role of the condition of transversality.
11	Endogenous technical progress: Romer's model. Existence of equilibrium growth rates.
12	Endogenous technical progress: Lucas' model. Existence of equilibrium growth rates. Equivalence with the model of Romer.
13	A superficial introduction to the problem of existence, uniqueness and stability in the models of Romer and Lucas.
14	The conditions of transversality in the models of Romer and Lucas.