



UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Dinamica dei Sistemi Aziendali

2627-1-F7703M006-F7703M006-2

Learning objectives

Learning Objectives

The course aims to provide students with the mathematical knowledge and tools required to understand and model the dynamics of business systems and to solve optimization problems in support of business decision-making.

Knowledge and Understanding

By the end of the course, students will be familiar with the main mathematical tools used for the analysis and optimization of business systems. In particular, they will understand the role of multivariable functions, unconstrained and constrained optimization models, and linear programming within business decision-making processes.

Applying Knowledge and Understanding

Students will be able to formulate business problems through mathematical models by identifying decision variables, objective functions, and constraints. They will be able to apply optimization techniques and linear programming methods to support decisions related to production, resource allocation, logistics, and business planning. Students will also be able to use software tools such as Microsoft Excel Solver and R to solve the models developed during the course.

Making Judgements

Students will be able to critically evaluate the results obtained from quantitative models, interpret their managerial implications, recognize their limitations, and compare alternative solutions under different constraints and decision-making scenarios.

Communication Skills

Students will be able to clearly and rigorously present the formulation of a business problem, the assumptions adopted, the methodology applied, and the interpretation of the results obtained, using appropriate mathematical and managerial terminology.

Learning Skills

Students will acquire the methodological tools needed to independently deepen their knowledge of more advanced quantitative techniques for analysis and optimization, and to apply these tools to new business and organizational contexts.

Contents

The course introduces mathematical models useful for solving decision-making and management problems in a business context.

In particular, the course covers the classic models of non-linear optimisation and linear programming. Part of the course will be devoted to the use of software such as Excel Solver and R packages for optimisation. These models are applied to solve typical problems encountered in the business world.

Detailed program

Introduction to mathematical modelling and construction of quantitative models to support business decision-making.

Eigenvalues, eigenvectors and quadratic forms

Functions of several variables

Non-linear optimisation, including unconstrained and constrained optimisation problems.

Linear optimisation (linear programming models).

Use of optimisation tools, with applications through Microsoft Excel Solver and an introduction to R and the IpSolve package.

Business applications and case studies related to production planning, resource allocation, logistics and managerial decision-making.

Prerequisites

Basics maths from courses in any bachelor's degree in economics

Teaching methods

Lectures in presence, with tutoring sessions in preparation for the final exam.

Lectures will take place in the traditional form. Some lessons will be held remotely (no more than 30% of the course's total hours).

A small part (approximately 10% - 3 lectures of 2 hours) of the teaching will be interactive lessons (comprehension of the topics, interactive exercises).

Assessment methods

The written exam evaluates the knowledge of the mathematical formal language, the proficiency and competencies gained during the course.

It consists of open questions on all topics covered in the course. The questions will be theoretical, for extensive testing of the exam program and exercises.

There are no intermediate tests.

Textbooks and Reading Materials

F. S. Hillier, G. J. Lieberman, Ricerca Operativa, McGraw-Hill, 2006

L. Bellenzier, R. Grassi, S. Stefani, A. Torriero, Metodi quantitativi per il management, Esculapio Editore, Bologna, 2012

Semester

First Term

Teaching language

Italian

Sustainable Development Goals

QUALITY EDUCATION
