Course Descriptions None 2025-2026

Course Title	Optimisation
Course Code	EBC2105
ECTS Credits	6,5
Assessment	Whole/Half Grades

Period

Period	Start	End	Mon	Tue	Wed	Thu	Fri
1	1-9-2025	17-10-2025	X		X		X

Level	Introductory/Intermediate
Coordinator	Stan van Hoesel, Janos Flesch For more information:s.vanhoesel@maastrichtuniversity.nl; j.flesch@maastrichtuniversity.nl
Language of instruction	English
Goals	* Students can find the right method to solve a given mathematical problem. * Students can apply the linear and nonlinear optimization methods to concrete mathematical problems. * Students can validate the method and the solution, depending on the mathematical problem. * Students learn the concepts and solution method (the simplex method) for linear constrained optimization problems. * Students can apply the linear optimization method to problems in game theory and network flow problems. * Students learn the concepts and solution methods for nonlinear unconstrained and constrained optimization problems. * Students learn the definition of concave and convex functions, their characterizations, and their importance in nonlinear optimization problems. * Students can recognize concave and convex functions by applying their characterizations. * Students can clearly present their solutions of mathematical problems in groups.
Description	Optimisation problems arise in all fields that econometricians encounter, such as operations research, game theory, statistics, micro- and macroeconomics and finance. The aim of this course is to show the methodology for solving constraint optimisation problems both for linear and non-linear problems. These methodologies are also known as Linear and Non-Linear Programming, respectively. The following topics and techniques will be treated: the standard simplex method, duality, sensitivity analysis, the primal-dual simplex method, the network simplex method, first and second order necessary and sufficient conditions, the Lagrangian-function, Kuhn-Tucker conditions and constraint qualification. Besides this, special attention is paid to the application of these methodologies in practical problems.
Literature	Vanderbei, R.J., Linear Programming: Foundations and Extensions, 5th edition, Springer, ISBN 978-3-030-39414-1 ISBN 978-3-030-39415-8 (eBook) https://doi.org/10.1007/978-3-030-39415-8
Prerequisites	Basic algebra (for linear programming), and advanced calculus (for nonlinear programming). Exchange students need to be aware that very specific pre-knowledge is required for this course. A solid background in mathematics is necessary. Students should be aware of the following concepts: Algebra: working knowledge of vector computing and matrices (including inverse matrices). Linear equations, and find the solutions of a set of equations etc. Function theory on the level of optimisation of functions of multiple variables under side conditions (Lagrange multipliers) An advanced level of English.
Transitional Regulations	
Teaching methods	PBL / Lecture / Assignment
Assessment methods	Written Exam
Evaluation in previous academic year	For the complete evaluation of this course please click http://iwio-sbe.maastrichtuniversity.nl/rapporten.asp?referrer=codeUM

This course belongs to the following programme / specialisation

Bachelor Econometrics and Operations Research	Year 2 Compulsory Courses