Course Descriptions Bachelor 2023-2024

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

Period

Period	Start	End	Mon	Tue	Wed	Thu	Fri
1	4-9-2023	20-10-2023	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.
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 Course(s)