Course Descriptions None 2022-2023

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

Period

Period	Start	End	Mon	Tue	Wed	Thu	Fri
1	5-9-2022	21-10-2022	X		X		X

Level	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	PLEASE NOTE THAT THE INFORMATION ABOUT THE TEACHING AND ASSESSMENT METHOD(S) USED IN THIS COURSE IS WITH RESERVATION. A RE-EMERGENCE OF THE CORONAVIRUS AND NEW COUNTERMEASURES BY THE DUTCH GOVERNMENT MIGHT FORCE COORDINATORS TO CHANGE THE TEACHING AND ASSESSMENT METHODS USED. THE MOST UP-TO-DATE INFORMATION ABOUT THE TEACHING/ASSESSMENT METHOD(S) WILL BE AVAILABLE IN THE COURSE SYLLABUS. 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, 4th ed., Springer, 2014, ISBN 978-1-4614-7629. * Sydsaeter K, Hammond P, Seierstad A, Strom A (2008): Further mathematics for economic analysis. Essex UK, Prentice Hall (2nd edition). ISBN: 978-0-273-71328-9.
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
Assessment methods	Attendance / Participation / 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)