

## Course Descriptions None 2024-2025

Course Title	Optimisation																
Course Code	EBC2105																
ECTS Credits	6,5																
Assessment	Whole/Half Grades																
Period	<table border="1"> <thead> <tr> <th>Period</th> <th>Start</th> <th>End</th> <th>Mon</th> <th>Tue</th> <th>Wed</th> <th>Thu</th> <th>Fri</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>2-9-2024</td> <td>20-10-2024</td> <td>X</td> <td></td> <td>X</td> <td></td> <td>X</td> </tr> </tbody> </table>	Period	Start	End	Mon	Tue	Wed	Thu	Fri	1	2-9-2024	20-10-2024	X		X		X
Period	Start	End	Mon	Tue	Wed	Thu	Fri										
1	2-9-2024	20-10-2024	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	<ul style="list-style-type: none"> <li>* Students can find the right method to solve a given mathematical problem.</li> <li>* Students can apply the linear and nonlinear optimization methods to concrete mathematical problems.</li> <li>* Students can validate the method and the solution, depending on the mathematical problem.</li> <li>* Students learn the concepts and solution method (the simplex method) for linear constrained optimization problems.</li> <li>* Students can apply the linear optimization method to problems in game theory and network flow problems.</li> <li>* Students learn the concepts and solution methods for nonlinear unconstrained and constrained optimization problems.</li> <li>* Students learn the definition of concave and convex functions, their characterizations, and their importance in nonlinear optimization problems.</li> <li>* Students can recognize concave and convex functions by applying their characterizations.</li> <li>* Students can clearly present their solutions of mathematical problems in groups.</li> </ul>																
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) <a href="https://doi.org/10.1007/978-3-030-39415-8">https://doi.org/10.1007/978-3-030-39415-8</a>																
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)																
Teaching methods	An advanced level of English. PBL / Lecture / Assignment																
Assessment methods	Written Exam																
Evaluation in previous academic year	For the complete evaluation of this course please click <a href="http://iwio-sbe.maastrichtuniversity.nl/rapporten.asp?referrer=codeUM">http://iwio-sbe.maastrichtuniversity.nl/rapporten.asp?referrer=codeUM</a>																
This course belongs to the following programme / specialisation	Bachelor Econometrics and Operations Research      Year 2 Compulsory Course(s)																