

## Course Descriptions Bachelor 2021-2022

Course Title	Optimisation																
Course Code	EBC2105																
ECTS Credits	6,5																
Assessment	Whole/Half Grades																
Period	<table><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><tr><td>1</td><td>30-8-2021</td><td>15-10-2021</td><td>X</td><td></td><td>X</td><td></td><td>X</td></tr></table>	Period	Start	End	Mon	Tue	Wed	Thu	Fri	1	30-8-2021	15-10-2021	X		X		X
Period	Start	End	Mon	Tue	Wed	Thu	Fri										
1	30-8-2021	15-10-2021	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	<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	<ul style="list-style-type: none"><li>* Vanderbei, R.J., Linear Programming: Foundations and Extensions, 4th ed., Springer, 2014, ISBN 978-1-4614-7629.</li><li>* 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.</li></ul>																
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																
Assessment methods	Attendance / Participation / 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)																