# Course Descriptions None 2022-2023

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| 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 |

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| 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.<br>* Students can apply the linear and nonlinear optimization methods to concrete mathematical problems.<br>* Students can validate the method and the solution, depending on the mathematical problem.<br>* Students learn the concepts and solution method (the simplex method) for linear constrained optimization problems.<br>* Students can apply the linear optimization method to problems in game theory and network flow problems.<br>* Students learn the concepts and solution methods for nonlinear unconstrained and constrained optimization problems.<br>* Students learn the definition of concave and convex functions, their characterizations, and their importance in nonlinear optimization problems.<br>* Students can recognize concave and convex functions by applying their characterizations.<br>* 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.<br><br>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.<br>* 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).<br>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.<br>Function theory on the level of optimisation of functions of multiple variables under side conditions (Lagrange multipliers)<br><br>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

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| Bachelor Econometrics and Operations Research | Year 2 Compulsory Course(s) |