



University of Pretoria Yearbook 2022

Mathematical optimisation 750 (WTW 750)

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| Qualification | Postgraduate |
| Faculty | Faculty of Natural and Agricultural Sciences |
| Module credits | 15.00 |
| NQF Level | 08 |
| Programmes | BScHons (Mathematics and Mathematics Education) (Algebra and Analysis) BScHons (Mathematics and Mathematics Education) (Applied Analysis) BScHons (Mathematics and Mathematics Education) (Differential Equations and Modelling) BScHons <i>Applied Mathematics</i> BScHons <i>Financial Engineering</i> BScHons <i>Mathematics of Finance</i> |
| Prerequisites | Multivariate Calculus on 2nd-year level; Linear Algebra on 2nd-year level |
| Contact time | 2 lectures per week |
| Language of tuition | Module is presented in English |
| Department | Mathematics and Applied Mathematics |
| Period of presentation | Semester 1 |

Module content

Classical optimisation: Necessary and sufficient conditions for local minima. Equality constraints and Lagrange multipliers. Inequality constraints and the Kuhn-Tucker conditions. Application of saddle point theorems to the solutions of the dual problem. One-dimensional search techniques. Gradient methods for unconstrained optimisation. Quadratically terminating search algorithms. The conjugate gradient method. Fletcher-Reeves. Second order variable metric methods: DFP and BFGS. Boundary following and penalty function methods for constrained problems. Modern multiplier methods and sequential quadratic programming methods. Practical design optimisation project.

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specific regulations and information as stipulated in the relevant yearbook. Ignorance concerning these regulations will not be accepted as an excuse for any transgression, or basis for an exception to any of the aforementioned regulations.