University of Pretoria Yearbook 2018

Mathematical optimisation 750 (WTW 750)

Qualification	Postgraduate
Faculty	Faculty of Natural and Agricultural Sciences
Module credits	15.00
Programmes	BScHons Applied Mathematics
	BScHons Financial Engineering
	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 Mathematics of Finance
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 BFCS. Boundary following and penalty function methods for constrained problems. Modern multiplier methods and sequential quadratic programming methods. Practical design optimisation project.