

# University of Pretoria Yearbook 2020

## Mathematical optimisation 750 (WTW 750)

<b>Qualification</b>	Postgraduate
<b>Faculty</b>	<a href="#">Faculty of Natural and Agricultural Sciences</a>
<b>Module credits</b>	15.00
<b>Programmes</b>	<a href="#">BScHons Applied Mathematics</a> <a href="#">BScHons Financial Engineering</a> <a href="#">BScHons Mathematics and Mathematics Education Algebra and Analysis</a> <a href="#">BScHons Mathematics and Mathematics Education Applied Analysis</a> <a href="#">BScHons Mathematics and Mathematics Education Differential Equations and Modelling</a> <a href="#">BScHons Mathematics of Finance</a>
<b>Prerequisites</b>	Multivariate Calculus on 2nd-year level; Linear Algebra on 2nd-year level
<b>Contact time</b>	2 lectures per week
<b>Language of tuition</b>	Module is presented in English
<b>Department</b>	Mathematics and Applied Mathematics
<b>Period of presentation</b>	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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