



# University of Pretoria Yearbook 2021

## Mathematical optimisation 750 (WTW 750)

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| <b>Qualification</b>          | Postgraduate   |
| <b>Faculty</b>                | <a href="#">Faculty of Natural and Agricultural Sciences</a>   |
| <b>Module credits</b>         | 15.00  |
| <b>NQF Level</b>              | 08   |
| <b>Programmes</b>             | <a href="#">BScHons Applied Mathematics</a><br><a href="#">BScHons Financial Engineering</a><br><a href="#">BScHons Mathematics and Mathematics Education Applied Analysis</a><br><a href="#">BScHons Mathematics and Mathematics Education Differential Equations and Modelling</a><br><a href="#">BScHons Mathematics and Mathematics Education Algebra and Analysis</a><br><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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