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# University of Pretoria Yearbook 2017

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## 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 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

**Academic organisation** Mathematics and Applied Maths

**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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