# 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 Applied Mathematics |
| | BScHons Financial Engineering |
| | BScHons Mathematics and Mathematics Education Applied Analysis |
| | BScHons Mathematics and Mathematics Education Differential Equations and Modelling |
| | BScHons Mathematics and Mathematics EducationAlgebra and Analysis |
| | 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.