# University of Pretoria Yearbook 2021

# Dynamical systems 782 (WTW 782)

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| **Qualification** | Postgraduate |
| **Faculty** | Faculty of Natural and Agricultural Sciences |
| **Module credits** | 15.00 |
| **NQF Level** | 08 |
| **Programmes** | BScHons Applied Mathematics |
| **Prerequisites** | No prerequisites. |
| **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**

Introduction to the general theory of dynamical systems and to the theory of dynamical systems represented via systems of ODEs. Quantitative and qualitative analyses of linear systems. Qualitative analysis of nonlinear systems: domain, invariant sets, stability of equilibria, Hartman-Grobman theorem, centre manifold theorem, Lyapunov method. Structural stability and bifurcation. Bifurcation of equilibria. Hopf bifurcation. Applications: population models, chemical reactions, circuits.