

# University of Pretoria Yearbook 2022

## Dynamical systems 887 (WTW 887)

<b>Qualification</b>	Postgraduate
<b>Faculty</b>	<a href="#">Faculty of Natural and Agricultural Sciences</a>
<b>Module credits</b>	1.00
<b>NQF Level</b>	09
<b>Prerequisites</b>	Functional Analysis, Partial Differential Equations and Finite Element Method on honours level
<b>Contact time</b>	1 lecture 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

\*Consult with the Head of the Department of Mathematics and Applied Mathematics about the availability of this master's module in a particular year.

Finite dimensional dynamical systems: Autonomous and non-autonomous systems of differential equations, dynamical systems, linear and nonlinear systems, existence and uniqueness of solutions, extension of solutions, maximal solution and maximal interval of existence, phase space and phase portrait. Stability theory for equilibria and periodic orbits using linear approximation, Liapunov's method and other energy methods and discrete dynamical systems (Poincaré map). Introduction to strange attractors. Application to mechanics and population models. Infinite dimensional dynamical systems: Semigroups, first and second order abstract differential equations, Sobolev spaces, finite dimensional approximation. Application to heat conduction and mechanical vibration. Examples of nonlinear systems.

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