This unit builds on the ideas of MATH3327 3A7: Chaos and Dynamical Systems. It delves deeper into the meaning of chaos and the implications it has for modelling reality. Topics that may be included are

(1) probabilistic properties of deterministic systems;

(2) chaos is not randomness, but probability theory can be applied and provide some useful characterisations of chaos;

(3) structural stability—under what conditions will a model of a system have essentially the same dynamics as the system, taking into account the model will have some error?;

(4) shadowing—how do you find the 'true' trajectory when given only noisy observations?;

(5) embedding—if you only knew a system has a finite number of variables (finite dimensional map or ODE), but did not know how many, then how many different quantities should be measured to completely discover the dynamics? The surprise answer is usually only one is necessary; and

(6) nonlinear time series analysis—how to use information theory to build a model of the dynamics of a system.

For more info see: http://handbooks.uwa.edu.au/units/math/math7426