

## COURSE SPECIFICATION FORM

<b>DEPARTMENT OF: Mathematics</b>				<b>Academic Session: 2020-21</b>	
<b>Course Code:</b>	MT3280	<b>Course Value:</b>	15 credits	<b>Status:</b> <i>(ie: Core, or Optional)</i>	Optional
<b>Course Title:</b>	Non-Linear Dynamical Systems: Routes to Chaos			<b>Availability:</b> <i>(state which teaching terms)</i>	Term 1
<b>Prerequisites:</b>	MT1720 and MT1820			<b>Recommended:</b>	
<b>Co-ordinator:</b>					
<b>Course Staff</b>					
<b>Learning Objectives:</b>	This module will introduce students to the fundamentals of the analysis of nonlinear dynamical systems. Students will investigate whether the behaviour of a nonlinear system can be predicted from the corresponding linear system.				
<b>Learning Outcomes:</b>	On completion of the module, students should be able to: identify and classify the critical points for both discrete and continuous dynamical systems; understand when and why the direct and indirect Liapunov methods are appropriate and use them both; understand when a limit cycle can, and cannot, occur and prove the non-existence as appropriate; recognise the role of the linear system in predicting the long-term behaviour of the nonlinear system.				
<b>Teaching &amp; Learning Methods:</b>	30 hours of lectures. 120 hours of private study, including work on problem sheets and examination preparation. This may include discussions with the course leader if the student wishes.				
<b>Key Bibliography:</b>	Dynamical Systems, Differential Equations, Maps and Chaotic Behaviour – D K Arrowsmith and C M Place (Chapman & Hall). <i>Library Ref. 515.41 ARR</i> Differential Equations, Dynamical Systems and an Introduction to Chaos – M W Hirsch, S Smale and R Devaney (Academic Press). <i>Library Ref. 515.41 HIR</i> Elementary Differential Equations and Boundary Value Problems – W E Boyce & R C di Prima (Wiley). <i>Library Ref. 515.41 BOY</i>				
<b>Formative Assessment &amp; Feedback:</b>	Formative assessment in the form of 8 problem sheets. The students will receive feedback as written comments on their attempts, and discussion within classes.				
<b>Summative Assessment:</b>	<b>Exam (%)</b> A two-hour written exam: 85% <b>Coursework (%)</b> Set exercises: 15%				