SM-4315			
Dynamical Systems and Chaos			
Bachelor of Science (Mathematics)			
Major Option			
4	Total student Workload	10	hours/week
	Contact hours	4	hours/week
SM-2201 Ordinary Differential Equations			
None			
Aims			
This module aims to teach students the basic concepts of dynamical systems and chaos, enabling			
them to analyse the behaviour of dynamical systems and investigate their stability. The module will			
also introduce students to the concepts of chaos, fractals and strange attractors. Each topic shall			
include applications from various disciplines in the social, medical, biological and physical sciences,			
as well as other areas.			
Learning Outcomes			
On successful completion of this module, a student will be expected to be able to:			
- understand the basic principles of dynamical systems and chaos.			
- Understand how to apply these principles in scientific problems.			
- analyse the various equations and how to use them in solving real scientific			
problems.			
- interpret the results of analyses, and make an appropriate report for an			
effective communication			
- work independently and play effectively in collaboratively in a team,			
especially in tutorial class.			
Module Contents			
- Introduction to dynamical systems. Chaos, fractals, and dynamics.			
- Nonlinearity, one-Dimensional Flows, geometric way of thinking, fixed points and stability,			
population growth, linear stability analysis, existence and uniqueness, impossibility of			
Disclinations, potentials and solving equations using software.			
Elows on the sircle. Two Dimensional Elows, Linear systems, Definitions and examples			
classification of linear			
- Systems Phase Plane Phase portraits existence uniqueness and topological			
consequences fixed points and linearisation rabbits versus sheep conservative systems			
reversible systems, pendulum and index theory.			
- Limit Cycles, Chaos.			
- Fractals. Strange Attractors.			
native Tuto	rial and feedback.		
ssment			
mative Exam	ination: 60%		
ssment Cour	sework: 40%		
- 2 te	sts (30%)		
- 1 as	signment (10%)		
	SM-4315 Dynamical Syst Bachelor of Sci Major Option 4 SM-2201 Ordin None • teach students behaviour of dyne eteach students behaviour of dyne etion of this mode - understand the - optoblems. - interpret the effective come especially in n to dynamical servectors y, one-Dimension growth, linear potentials and servectors s. he circle. Two-D hease Plane. cs. nof linear Phase Plane. cs. native Exame smat	SM-4315 Dynamical Systems and Chaos Bachelor of Science (Mathematics) Major Option 4 Total student Workload Contact hours SM-2201 Ordinary Differential Equations None • teach students the basic concepts of dynamical systems and investigate the ents to the concepts of chaos, fractals and strange from various disciplines in the social, medical, biolocs. etion of this module, a student will be expected to b - understand the basic principles of dynamical systems. - understand how to apply these principles in scie - analyse the various equations and how to use th problems. - interpret the results of analyses, and make an ap effective communication - work independently and play effectively in collate especially in tutorial class. n to dynamical systems. Chaos, fractals, and dynam y, one-Dimensional Flows, geometric way of thinkin growth, linear stability analysis, existence and in potentials and solving equations using software. s. especially in tutorial class. n to dynamical systems. Chaos, fractals, and dynam y, one-Dimensional Flows, geometric way of thinkin growth, linear stability analysis, existence and in potentials and solving equations using software. s. s. he circle. Two-Dimensional Flows. Linear systems of linear Phase Plane. P	SM-4315 Dynamical Systems and Chaos Bachelor of Science (Mathematics) Major Option 4 Total student Workload 10 Contact hours 4 SM-2201 Ordinary Differential Equations None teach students the basic concepts of dynamical systems behaviour of dynamical systems and investigate their stabi inst to the concepts of chaos, fractals and strange attract from various disciplines in the social, medical, biological ar s. etion of this module, a student will be expected to be able t - understand the basic principles of dynamical systems and - Understand how to apply these principles in scientific pr - analyse the various equations and how to use them in scientific pr - interpret the results of analyses, and make an appropria effective communication - work independently and play effectively in collaborative especially in tutorial class. n to dynamical systems. Chaos, fractals, and dynamics. y, one-Dimensional Flows, geometric way of thinking, fixed growth, linear stability analysis, existence and uniquere science, fixed points and linearisation, rabbits versus sheep, class, fixed points and linearisation, rabbits versus sheep, classent Phase Plane. Phase portraits, existence, uniquenesc