

<b>Faculty</b>	Natural Sciences		
<b>Home Department</b>	Mathematics and Applied Mathematics		
<b>Module Topic</b>	Mathematical Modeling		
<b>Generic Module Name</b>	Mathematics 312		
<b>Alpha-numeric Code</b>	<b>MAT312</b>		
<b>NQF Level</b>	7		
<b>NQF Credit Value</b>	30		
<b>Duration</b>	Semester		
<b>Proposed semester to be offered</b>	First Semester		
<b>Programmes in which the module will be offered</b>	BSc (Mathematical and Statistical Sciences) (3227, 3031) BSc (Physical Science) (3233, 3120) BSc (Computer Science) (3221, 3023)		
<b>Year Level</b>	3		
<b>Main Outcomes</b>	<p>On completion of this module students should be able to:</p> <ul style="list-style-type: none"> <li>Analyse and simulate mathematical models for dynamical population systems.</li> <li>Understand the basics in epidemiology</li> <li>Understand how to formulate and solve optimal control problems</li> </ul>		
<b>Main Content</b>	<ul style="list-style-type: none"> <li>Population models: Equilibrium solutions, stability, direction fields, phase portraits;</li> <li>Epidemic models, predator-prey models, competing species models, co-operating species models, food chains.</li> <li>Dynamic optimization in discrete and continuous time.</li> <li>Optimization in environmental management (eg. fisheries, harvesting, hunting etc.)</li> <li>Numerical methods to solve differential equations arising from the topics mentioned above</li> </ul>		
<b>Pre-requisite modules</b>	MAT211 and (MAT212 or MAT221)		
<b>Co-requisite modules</b>	None		
<b>Prohibited module Combination</b>	None		
<b>Breakdown of Learning Time</b>	<b>Hours</b>	<b>Time-table Requirement per week</b>	<b>Other teaching modes that does not require time-table</b>
<i>Contact with lecturer / tutor:</i>	39	Lectures p.w.	3
<i>Assignments &amp; tasks:</i>	23	Practicals p.w.	3
<i>Practicals:</i>	23	Tutorials p.w.	2
<i>Assessments:</i>	39		
<i>Self-study:</i>	150		
<i>Other: Tutorials</i>	26		
<b>Total learning time:</b>	<b>300</b>		
<b>Method of Student Assessment</b>	Continuous Assessment (CA): 50% Final Assessment (FA): 50%		
<b>Assessment Module Type</b>	Continuous and Final Assessment (CFA)		