Module code	SM-4322			
Module Title	Functional Analysis			
Degree/Diploma	Bachelor of Science (Mathematics)			
Type of Module	Major Option			
Modular Credits	4	**Total student Workload**	10	hours/week
		Contact hours	4	hours/week
Prerequisite	SM-4327 Real Analysis			
Anti-requisite	None			

Aims

To learn properties of general mathematical objects with algebraic and topological structures.

Learning Outcomes

On successful completion of this module, a student will be expected to be able to:

Lower order :	40%	- understand basic concepts and tools of functional analysis and use them in applications
Middle order :	40%	- use general approach to some structures in real and complex analysis
Higher order:	20%	- understand main algebraic structures and use their properties

Module Contents

- Metrics and metric spaces. Subspaces. Open and closed sets in metric spaces.
- Convergence of sequences. Cauchy sequences and completeness. Normed spaces. Banach spaces.
- Spaces of sequences. Function spaces with supremum norm. Finite dimensional spaces.
- Linear operators. Boundedness and continuity. Spaces of linear operators. Linear functionals. The dual space. Hahn-Banach theorem with examples and applications.
- Inner product spaces. Hilbert spaces. Orthogonality in Hilbert spaces. Best approximation.
- Orthogonal complements. Direct sum. Orthonormal sets and sequences. The dual of a Hilbert space.

Assessment	Formative assessment	Tutorial and feedback.
	Summative assessment	Examination: 60%
		Coursework: 40% - 1 class test (20%) - 1 assignment (20%)