Mathematics

Course List

Code	*Course Title*	*Unit*
M.Sc. Programme (Full-time and Part-time)		
MAT 5011, 5012	Real Analysis I, II	3 each
MAT 5031, 5032	Complex Analysis I, II	3 each
MAT 5051, 5052	Abstract Algebra I, II	3 each
MAT 5070	Topology of Manifolds	3
MAT 570S [5001]	Guided Studies I	3
MAT 571S	Linear Analysis	3
MAT 572S	Discrete Mathematics	3
MAT 573S	Complex Analysis and Its Applications	3
MAT 574S	Algebra and Geometry	3
MAT 580S [5002]	Guided Studies II	3
MAT 581S	Mathematics for Logistics	3
MAT 582S	Modelling and Optimization of Supply Chains	3
MAT 583S	Financial Mathematics	3
MAT 6011, 6012	Topics in Mathematics I, II	3 each
MAT 6021, 6022	Topics in Differential Geometry I, II	3 each
MAT 6031, 6032	Topics in Algebra I, II	3 each
MAT 6041, 6042	Topics in Partial Differential Equations I, II	3 each
MAT 6051, 6052	Topics in Complex Analysis I, II	3 each
MAT 6061, 6062	Topics in Number Theory I, II	3 each
MAT 6071, 6072	Topics in Topology I, II	3 each
MAT 6081, 6082	Topics in Functional Analysis I, II	3 each
MAT 6111, 6112	Topics in Applied Mathematics I, II	3 each
MAT 6121, 6122	Topics in Numerical Analysis I, II	3 each
MAT 6131, 6132	Topics in Optimization Theory I, II	3 each
MAT 6141, 6142	Topics in Applied Partial Differential Equations I, II	3 each

Course Description

MAT 5011
Real Analysis I
3 U; 3 Lect.
This course provides a solid foundation in the Lebsegue integration theory and basic techniques in analysis. Topics include σ-algebra of sets, measure theory, Lebsegue integration theory, convergence theorems, Lp-spaces and differentiation. Students taking this course are expected to have knowledge in advanced calculus and elementary analysis.

[ ] Old course codes used in 2002-03 and before.

MAT 5012
Real Analysis II
3 U; 3 Lect.
This course provides more advanced topics in real analysis. Topics include signed measures, Hahn decomposition theorem, Lebesgue decomposition theorem, product measures, Fubini theorem, measure and topology, and Riesz representation theorem. Students taking this course are expected to have knowledge in MAT 5011 or equivalent.

MAT 5031
Complex Analysis I
3 U; 3 Lect.
This course is intended to provide a solid and advanced training in the basic techniques and theorem of complex analysis. Topics include: properties of holomorphic functions, complex integration, conformal mappings, singularities and residues. Students taking this course are expected to have knowledge in advanced calculus and elementary analysis.

MAT 5032
Complex Analysis II
3 U; 3 Lect.
This is a continuation of MAT 5031; advanced topics in complex analysis will be selected from: Schwarz lemma, Riemann mapping theorem, Picard theorem, Weierstrass theorem and Mittag Leffler theorem, analytic continuation and introduction to Riemann surfaces. Students taking this course are expected to have knowledge in advanced calculus and elementary analysis.

MAT 5051
Abstract Algebra I
3 U; 3 Lect.
This course is intended to provide a solid background knowledge in abstract algebra. Topics include group theory, Sylow's theorems, structure of finitely generated abelian groups, rings and ideals, polynomial rings, principal ideal domain (PID), modules, fields, Galois theory. Students taking this course are expected to have knowledge in a first course in algebra.

MAT 5052
Abstract Algebra II
3 U; 3 Lect.
This is a continuation of MAT 5051. Topics include fields, cyclic extensions, separable extensions, integral ring extensions, integral Galois extensions, Noetherian rings and modules, localization, Hilbert basis theorem, primary decomposition. Students taking this course are expected to have knowledge in MAT 5051 or equivalent.

MAT 5070
Topology of Manifolds
3 U; 3 Lect.
This course is an introduction to several basic topological invariants for manifolds. Major topics are: differentiable manifolds and maps, Sard's theorem, degree of maps, fundamental group, covering space, homology group. Students taking this course are expected to have knowledge in elementary analysis.

MAT 570S
Guided Studies I
3 U; 3 STOT
Series of projects in pure or applied mathematics focusing on a central theme. Prerequisite: permission of the instructor.

MAT 571S
Linear Analysis
3 U; 3 Lect.
This course is designed for the M.Sc. Programme in Mathematics. The course is intended to provide an introduction to linear structures and various concepts of limits/convergence in analysis especially in the context of Euclidean/Hilbert/Banach spaces as well as the Lebesgue integration spaces.

MAT 572S
Discrete Mathematics
3 U; 3 Lect.
This course is designed for the M.Sc. Programme in Mathematics. The course is an introduction to discrete mathematics; topics will be chosen from: set theory, number theory, algebraic structures, graph theory and combinatorics.

MAT 573S
Complex Analysis and Its Applications
3 U; 3 Lect.
This course is designed for the M.Sc. Programme in Mathematics. The course is intended to provide an introduction to the analysis and applications of analytic functions on the complex plane. Emphasis will be placed on the understanding and appreciation of the theory as well as its wide range of usage. It includes the study of integrals, residues, series expansion, and conformality of analytic functions; transforms and their use in differential equations.

MAT 574S
Algebra and Geometry
3 U; 3 Lect.
This course is designed for the M.Sc. Programme in Mathematics. The course is an introduction to commutative algebra, in particular polynomial rings of one and several variables, their ideals and the associated varieties. The Hilbert basis theorem and Groebner bases algorithms are included.

MAT 580S
Guided Studies II
3 U; 3 STOT
Series of projects in pure or applied mathematics focusing on a central theme. This course is a continuation of MAT 570S. Prerequisite: permission of the instructor.

MAT 581S
Mathematics for Logistics
3 U; 3 Lect.
This course is designed for the M.Sc. Programme in Mathematics. The course provides the basic mathematical tools for logistics. Topics include: linear and nonlinear programming, resource allocation problem, shortest route problem, inventory and production problem, cargo loading problem, equipment replacement problem, reliability problem, max flow problem, decision tree analysis, production theory, maintenance and reliability theory.

MAT 582S
Modelling and Optimization of Supply Chains
3 U; 3 Lect.
This course is designed for the M.Sc. Programme in Mathematics. The course provides an introduction to model-building and optimization methods for supply chains. Topics include: modelling techniques; optimization methods for transportation, storage, handling and scheduling; inventory models; demand processes and prediction; review policies for single-item and single-location problems; multi-item models with constraints; multi-echelon and multi-indenture models.

MAT 583S
Financial Mathematics
3 U; 3 Lect.
This course is designed for the M.Sc. Programme in Mathematics. The course is an introductory course on Financial Mathematics. Topics include probability, hedging, arbitrage, vanilla options, binomial models, the Black-Scholes formula, exotic options, Monte Carlo methods and binomial methods.

MAT 6011, 6012
Topics in Mathematics I, II
3 U each; 3 Lect.
Usually, more than one section with various topics selected from advanced pure mathematics will be offered. The selection of the topics depends on the field of interest of the instructor. Prerequisite: permission of the instructor.

MAT 6021, 6022
Topics in Differential Geometry I, II
3 U each; 3 Lect.
Various topics selected from differential geometry. The selection of the topics depends on the field of interest of the instructor. Prerequisite: permission of the instructor.

MAT 6031, 6032
Topics in Algebra I, II
3 U each; 3 Lect.
Various topics selected from algebra. The selection of the topics depends on the field of interest of the instructor. Prerequisite: permission of the instructor.

MAT 6041, 6042
Topics in Partial Differential Equations I, II
3 U each; 3 Lect.
Various topics selected from partial differential equations. The selection of the topics depends on the field of interest of the instructor. Prerequisite: permission of the instructor.

MAT 6051, 6052
Topics in Complex Analysis I, II
3 U each; 3 Lect.
Various topics selected from complex analysis (one or several variables). The selection of the topics depends on the field of interest of the instructor. Prerequisite: permission of the instructor.

MAT 6061, 6062
Topics in Number Theory I, II
3 U each; 3 Lect.
Various topics selected from number theory. The selection of the topics depends on the field of interest of the instructor. Prerequisite: permission of the instructor.

MAT 6071, 6072
Topics in Topology I, II
3 U each; 3 Lect.
Various topics selected from topology. The selection of the topics depends on the field of interest of the instructor. Prerequisite: permission of the instructor.

MAT 6081, 6082
Topics in Functional Analysis I, II
3 U each; 3 Lect.
Various topics selected from functional analysis. The selection of the topics depends on the field of interest of the instructor. Prerequisite: permission of the instructor.

MAT 6111, 6112
Topics in Applied Mathematics I, II
3 U each; 3 Lect.
Usually, more than one section with various topics selected from advanced applied mathematics will be offered. Prerequisite: permission of the instructor.

MAT 6121, 6122
Topics in Numerical Analysis I, II
3 U each; 3 Lect.
Various topics selected from numerical analysis. The selection of the topics depends on the field of interest of the instructor. Prerequisite: permission of the instructor.

MAT 6131, 6132
Topics in Optimization Theory I, II
3 U each; 3 Lect.
Various topics selected from optimization theory. The selection of the topics depends on the field of interest of the instructor. Prerequisite: permission of the instructor.

MAT 6141, 6142
Topics in Applied Partial Differential Equations I, II
3 U each; 3 Lect.
Various topics selected from applied partial differential equations. The selection of the topics depends on the field of interest of the instructor. Prerequisite: permission of the instructor.

Study Scheme

M.Sc. Programme (Full-time and Part-time)

1. Coursework Requirement

Students are required to complete 24 units, with at least 18 units (6 courses) in Mathematics coded MAT 5xxx-6xxx.

2. Other Requirements

(a) IT Proficiency Test. (Please refer to “Student IT Competence”.)
(b) Minimum cumulative GPA of 2.0.