Rutgers University-New Brunswick

- 01:640:300:T5 Introduction to Mathematical Reasoning
  - Fundamental abstract concepts common to all branches of mathematics;
    Special emphasis placed on ability to understand and construct rigorous proofs
  - *Book of Proof* by Richard Hammack
  - Ms. Yael Davidov
  - A
- 01:640:311:T6 Introduction to Real Analysis I
  - Introduction to language and fundamental concepts of analysis;
    The real numbers, sequences, limits, continuity, differentiation in one variable
  - *Understanding Analysis* by Stephen Abbott
  - Mr. Érik Amorim
  - A
- 01:640:350:H1 Linear Algebra
  - Abstract vector spaces and linear transformations, inner product spaces, diagonalization, and canonical forms;
    Systems of ordinary differential equations and numerical linear algebra techniques
  - *Linear Algebra* by Friedberg, Insel & Spence;
    Linear Algebra Done Right by Axler
  - Dr. Samuel Cogar
  - Auditing
- 01:640:351:T6 Introduction to Abstract Algebra I
  - Abstract algrebraic systems, including groups, rings, fields, polynomials, and some Galois theory
  - *Abstract Algebra: an Introduction* by Thomas W. Hungerford
  - Dr. David Molnar
  - PASS (B+)
- 01:640:356:01 THEORY OF NUMBERS
  - Familiar with some of the basic objects in number theory (the integers, the primes, multiplicative functions) and to introduce some of the basic relations (congruences, quadratic residues)
  - *Elementary Number Theory & Its Applications* by Rosen
  - Dr. Chris Lutsko
  - Auditing
- 01:640:403:02 Introduction to Theory of Functions of a Complex Variable
  - First course in the theory of a complex variable;
    Cauchy's integral theorem and its applications;
    Taylor and Laurent expansions, singularities, conforal mapping
  - *Complex Variable* by Stephen D. Fisher
  - Prof. Bin Gui
  - Auditing
- 01:640:411:H1 Mathematical Analysis I
  - Rigorous analysis of the differential and integral calculus of one and several variables
  - *The Principles of Mathematical Analysis* by Walter Rudin
  - Dr. Mariusz Mirek

  - A

- 01:640:412:H1 Mathematical Analysis II
  - A development of the fundamental topics in the analysis of functions of a real variable; A continuation of 640:411 - Mathematical Analysis I
  - *The Principles of Mathematical Analysis* by Walter Rudin; *Real Analysis: Modern Techniques and Their Applications* by Gerald B. Folland
  - Dr. Mariusz Mirek
  - Currently learning

- 01:640:441:01 Introductory Topology I
  - Introduction to topology with emphasis on the foundations of analysis; Euclidean spaces, metric spaces, topological spaces, and their properties; Applications to analysis
  - *Topology* by James Munkres
  - Dr. Eric Ling
  - W

- 01:640:451:H1 ABSTRACT ALGEBRA I
  - Rigorous study of abstract algebraic systems including groups, rings, and fields
  - *Algebra* by Michael Artin
  - Prof. Daniel Krashen
  - A

- 01:640:452:H1 ABSTRACT ALGEBRA II
  - Rigorous study of abstract algebraic systems including groups, rings, and fields
  - *Algebra* by Michael Artin
  - Prof. Shira Gilat
  - Currently learning

- 01:640:494:01 Independent Study in Algebraic Topology
  - Basic concepts of algebraic topology, including the fundamental group, plane curves, homotopy, and a brief introduction to homology
  - *Topology* by James Munkres
  - Prof. Michael Beals
  - Audting

Stevens Institute of Technology

- PEP527 Mathematical Methods of Science and Engineering I
  - Fourier series, Bessel functions, and Legendre polynomials as involved in the solution of vibrating systems;
    Tensors and vectors in the theory of elasticity;
    Applications of vector analysis to electrodynamics;
    Vector operations in curvilinear coordinates;
    Numerical methods of interpolation and of integration of functions and differential equations
  - *Mathematical Methods for Physicists* by Arfken and Webber;
    Mathematics for Physics: A Guided Tour for Graduate Students by Goldbart Stone
  - Prof. Vladimir Lukic
  - A
- PEP528 Mathematical Methods of Science and Engineering II
  - Vector and Tensor Fields: transformation properties, algebraic and differential operators and identities, geometric interpretation of tensors, integral theorems;
    Dirac delta-function and Green's function technique for solving linear inhomogeneous equations;
    N-dimensional complex space: rotations, unitary and hermitian operators, matrix-dyadic-Dirac notation, similarity transformations and diagonalization, Schmidt orthogonalization;
    Introduction to functions of a complex variable: analyticity, Cauchy's theorem, Taylor and Laurent expansions, analytic continuation, multiple-valued functions, residue theorem, contour integration, asymptotics
  - *Mathematical Methods for Physicists* by Arfken and Webber
  - Prof. Vladimir Lukic
  - A
- MA547 Advanced Calculus I
  - Elementary topology of Euclidean spaces;
    Differential calculus of functions of several variables;
    Inverse and implicit function theorems;
    Integration;
    Differential forms;
    Theorems of Gauss, Green, and Stokes
  - *Real Variables with Basic Metric Space Topology* by Robert B. Ash
  - Dr. Charles Suffel
  - B-
- MA552 Axiomatic Linear Algebra
  - Prof. Alexei Miasnikov
  - Currently learning
- MA605-606 Foundation of Algebra I&II
  - Elementary number theory: Induction; Division theory of integers; Prime numbers, prime factorization; Congruence, rings; Fermat's little theorem; Chinese remainder theorem;
    Groups: Subgroups; Generating sets; Cosets; Homomorphisms of groups; Normal subgroups; Quotient groups; Isomorphisms; Direct product of groups; Permutation groups, Matrix groups, Solvable groups; Classification of finitely generated abelian groups; Sylow theorems; finite groups;
    Applications: Cryptography
  - *Abstract Algebra: Theory and Applications* by Thomas W. Judson
  - Prof. Alexei Miasnikov
  - A; currently learning
- MA611 Probability
  - Mathematical foundations of probability theory, with topics including probability spaces, random variables, probability distribution functions, convergence of random variables, and limit theorems

- *Probability: Theory and Examples* by Durrett;
  Probability and Measure by Billingsley;
  A Course in Probability Theory by Chung
- Dr. William H. Aeberhard
- A-

- MA635 Functional Analysis I&II
  - The foundations of measure theory and integration, the main principles of analysis in metric, normed, Banach and Hilbert spaces;
    Open, closed, compact sets, continuity, convergence, completeness, contraction mapping principle, linear operators and functionals
  - *Introductory Functional Analysis with Applications* by E.Kreyszig;
    Advanced Calculus by R.Wrede and M.Spiegel;
    Real Analysis by N.Haaser and J.Sullivan
  - Prof. Pavel Dubovski
  - A; currently learning

- MA651 Topology I
  - General topology (also known as point set topology)
  - *Elementary Topology: Problem Textbook* by O.Ya. Viro, O. A. Ivanov, N. Yu. Netsvetaev, V. M. Kharlamov
  - Prof. Robert Gilman
  - Currently learning

- MA900 Thesis in Mathematics
  - Writing thesis with topics in Geometric Group Theory and Hyperbolic Groups
  - Papers
  - Dr. Rizos Sklinos
  - In progress