

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 algebraic 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, conformal 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