

Concentration Requirements

Applied Mathematics

Math 4640 Numerical Analysis I
Math 4347 Partial Differential Equations I
Math 4541 Dynamics and Bifurcations I

Three of:

Math 4210 Mathematical Foundation for Data Science
Math 4348 Partial Differential Equations II (Not currently offered)
Math 4542 Dynamics and Bifurcations II (Not currently offered)
Math 4580 Linear Programming OR ISYE 3133 Engineering Optimization
Math 4581 Classical Mathematical Methods in Engineering
Math 4641 Numerical Analysis II (Not currently offered)
Math 4699 Undergraduate Research (approved topic related to the concentration; 3 hours;
can only be used once toward the concentration)
Math 4755 Mathematical Biology
Math 4777 Scientific Computing (Not currently offered)
Math 4782 Quantum Information and Quantum Computing
CX4140 Computational Modeling Algorithms
CX4240 Introduction to Computing for Data Analysis

Discrete Mathematics

CS 3510/3511 Design & Analysis of Algorithms
Math 4022 Graph Theory
Math 4032 Combinatorial Analysis

One of:

ISyE 3133 Engineering Optimization **OR** Math 4580 Linear Programming

Two of:

Math 4108 Abstract Algebra II*
Math 4150 Intro to Number Theory
Math 4280 Information Theory*
Math 4432 Introduction to Algebraic Topology*
Math 4012 Algebraic Structures in Coding Theory (Not currently offered)*
Math 4699 Undergraduate Research (approved topic related to the concentration; 3 hours;
can only be used once toward the concentration)
CS 4510 Automata & Complexity Theory
CS 4530 Randomized Algorithms*
CS 4540 Advanced Algorithms
ECON 4180 Game Theory for Economics*
ISYE 4133 Advanced Optimization
*= added 2022

Probability and Statistics

Math 3236 Statistical Theory **OR** Math 4261 Mathematical Statistics I
Math 4221 Stochastic Processes I

Four of:

Math 4210 Mathematical Foundation for Data Science
Math 4222 Stochastic Processes II (Not currently offered) Math 4255
Monte Carlo Techniques (Not currently offered) Math 4262
Mathematical Statistics II
Math 4280 Intro to Information Theory
Math 4580 Linear Programming **OR** ISYE 4133 Advanced Optimization
Math 4699 Undergraduate Research (approved topic related to the concentration; 3 hours;
can only be used once toward the concentration)
CS 4530 Randomized Algorithms*
CX 4240 Intro to Computing for Data Analysis **OR** CS 4641 Machine Learning
ECON 3161 Econometrics Analysis*
ISYE 4031 Regression and Forecasting*
* = added 2022

Pure Mathematics

Math 4318 Real Analysis II

One of:

Math 4108 Abstract Algebra II
Math 4150 Intro to Number Theory

One of:

Math 4431 Introduction to Topology
Math 4432 Intro to Algebraic Topology
Math 4441 Differential Geometry

Three courses from the following list (must be different from the courses used to satisfy the above requirements):

Math 4022 Intro to Graph Theory
Math 4032 Combinatorial Analysis
Math 4108 Abstract Algebra II
Math 4150 Intro to Number Theory
Math 4221 Stochastic Processes I
Math 4222 Stochastic Processes II (Not currently offered)
Math 4347 Partial Differential Equations I
Math 4348 Partial Differential Equations II (Not currently offered)
Math 4431 Introduction to Topology
Math 4432 Intro to Algebraic Topology
Math 4441 Differential Geometry
Math 4541 Dynamics and Bifurcations I
Math 4542 Dynamics and Bifurcations II (Not currently offered)
Math 4699 Undergraduate Research (approved topic related to the concentration; 3 hours;
can only be used once toward the concentration)

Data Science

MATH 4640 Numerical Analysis I
MATH 4210 Mathematical Foundation for Data Science

One of:

MATH 3236 Statistical Theory
MATH 4261 Mathematical Statistics I

Three of:

MATH 4022 Introduction to Graph Theory
MATH 4032 Combinatorial Analysis
MATH 4221 Stochastic Processes I
MATH 4222 Stochastic Processes II (Not currently offered)
MATH 4255 Monte Carlo Methods (Not currently offered)
MATH 4262 Mathematical Statistics II
MATH 4280 Introduction to Information Theory
MATH 4580 Linear Programming **OR** ISYE 3133 Engineering Optimization
MATH 4641 Numerical Analysis II (Not currently offered)
MATH 4699 Undergraduate Research (approved topic related to the concentration; 3 hours; can only be used once toward the concentration)
CS 4641 Machine Learning
CX 4240 Introduction to Computing for Data Analysis

NOTES:

1. Students may not list more than one concentration on their transcript.
2. Concentration requirements may also be used to satisfy the requirements for the B.S. in Mathematics.
3. Students must complete 4 List A Math Electives and 9 additional hours from List A or List B Math Electives (21 hours total). Concentration courses can be used to satisfy this requirement.

Examples:

Student satisfies item 3 and the Pure Math Concentration requirements by taking *Math 4318*, *Math 4150*, *Math 4431*, *Math 4348*, *Math 4222*, *Math 4699* and **Math 4640**. Courses in italics are for the concentration requirement; courses in bold face are List A math courses. Total: 21 hours.

Student satisfies item 3 and the Discrete Math Concentration requirements by taking *CS 3510*, **Math 4022**, **Math 4032**, *Math 4580*, *CS 4510*, *CS 4540* and **Math 4640** and **Math 3236**. Courses in italics are for the concentration requirement; courses in bold face are List A math courses. Total: 24 hours. The last 3 hours count as Free Elective.

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