



## Intro to Programming and Math for CS

The MPCS program has Immersion Courses in both programming and math. These fast-paced, rigorous, introductory classes will provide solid fundamentals in programming and discrete math to prepare students for classes in the MS in Computer Science program. Immersion classes are for admitted MPCS students only. Immersion classes can be taken either full-time or part-time. Classes are offered in the evenings in Hyde Park to accommodate working professionals.

Admitted MPCS students without a background in Programming and/or Discrete Math should plan to start the program with one or both of the immersion classes. Immersion classes are available to any admitted MPCS student.

The immersion courses covering the prerequisite material are:

**MPCS 50101 Concepts of Programming (Immersion Programming)**

**MPCS 50103 Math for Computer Science: Discrete Math (Immersion Math)**

### Immersion Programming Topics (PLACEMENT EXAM OR IMMERSION PROGRAMMING COURSE)

- **Data types (native and derived)**
- **Operators, precedence, and expressions**
- **Assignment and statements**
- **Control flow (conditionals and iteration)**
- **Functions, return types, and parameters**
- **Recursion**
- **Console and file I/O**

The programming placement exam is a 90 minute computer based exam. A full list of supported languages can be found in the placement exam study materials on our website.

### Immersion Math Topics (PLACEMENT EXAM OR IMMERSION MATH COURSE)

- **Logic: propositional logic; quantifiers.**
- **Mathematical reasoning: methods of proof, direct proof and indirect proof. Mathematical induction and strong induction.**
- **Counting: methods of counting; permutations, combinations, binomial theorem, pigeonhole principle, inclusion-exclusion.**
- **Discrete probability: discrete probability spaces; conditional probability and independence; Bernoulli trials, Bayes's**
- **theorem, random variables and expected value; variance, geometric and binomial distributions.**
- **Asymptotic notation.**
- **Recurrences and methods of solving recurrences.**
- **Graphs: simple graphs, isomorphism, paths, trees.**
- **Modular arithmetic, divisibility, prime numbers; GCD and Euclid's algorithm, Fermat's little theorem.**
- **Familiarity with sets, functions, and relations will be assumed.**

The math placement exam is a 2-hour paper based exam.

— **Successful completion of the CS Immersion courses allows students to directly enter the MS in Computer Science Program . Please view the placement exam study materials on our website.** —