

PROFESSIONAL PROGRAM

DEPARTMENT OF COMPUTER SCIENCE THE UNIVERSITY OF CHICAGO

RYERSON HALL, 1100 EAST 58TH STREET, CHICAGO, IL 60637

REQUIREMENTS FOR SUCCESSFUL WAIVER OF THE IMMERSION COURSEWORK

This waiver is also part of the on-line application and will be reviewed with your application. If you prefer to submit the waiver by mail, then follow the instructions below.

If you believe that you meet the requirements listed in this document, and agree to the conditions stated on page 4 and understand your obligation in this regard, then complete all fields, initialize each page at the bottom right corner (i.e., inscribe your initials), sign at the end of the last page, and return it by mail to the following address:

Waivers CSPP
Department of Computer Science
The University of Chicago
1100 East 58th St
Chicago, IL 60637

Prior to returning this document to us, please review the following checklist.

- You have read and initialized the second page of the form, at the bottom right;
- You have read and initialized the third page of the form, at the bottom right;
- You have entered all the requested information on page four, including your full name, and email address;
- You have signed and dated the form at the bottom of the fourth page.

IMMERSION MATH

EITHER:

For Math I: Discrete Mathematics:

Logic: propositional logic; predicates and quantifiers; rules of inference.

The integers: basic properties of the integers, divisibility; prime numbers.

Mathematical reasoning: methods of proof, direct proof and indirect proof. Mathematical induction. Sets and set operations. Power set and cardinality of sets. Proof using set identities.

Functions: definition and properties of functions. Composition of functions. Injections, surjections, and inverses. Exponentials, logarithms, factorials, polynomials.

Summations: arithmetic and geometric progressions. Finding closed forms.

Relations: properties of binary relations.

Composition and closures. Equivalence relations and partial orders. Matrices.

Modular arithmetic: basic arithmetic of the integers mod p .

Graphs: definition of graphs, paths, trees.

For Math II: Counting and Discrete Probability:

Growth of functions: asymptotic notation and asymptotic order of functions.

Recursive definitions, recursively defined functions, Fibonacci numbers.

Recurrences: methods of solving recurrences.

Counting: basic of counting; permutations, combinations, binomial theorem.

Discrete probability: probability distribution; conditional probability and independence; random variables and expectation; variance. Statistics: mean, variance, and standard deviation, normal distribution, geometric and binomial distributions.

OR

Students, who have a B.A. or a M.A. degree in mathematics, are permitted to place out of immersion mathematics. Other students who have taken higher-level mathematics courses may petition for placement.

There are some topics in calculus and algebra that are relevant to discrete mathematics; they are listed here.

Calculus topics: basic properties of numbers, proof by induction; functions, limits, continuous functions, inverse functions, least upper bounds; logarithm and exponential functions, polynomial functions; infinite sequences, infinite series.

Note: the calculus course should have exposed the student to proofs and should not be limited to solving simple problems (e.g., finding derivatives and integrals by applying a rule).

Algebra topics: integers, divisors, prime numbers, congruences; functions, equivalence relations, permutations; polynomials, roots of polynomials; matrices and linear algebra.

Note: the standard topics in abstract algebra courses are groups, rings, fields, vector spaces, linear algebra, and polynomials in several variables. Number theory and matrices are the only topics that are directly relevant to discrete mathematics.

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PROGRAMMING (IN C OR SIMILAR LANGUAGE)

EITHER

- Basic design cycle on unix systems
 - use a standard editor (vi, emacs, etc.)
 - understand how to run, set options for gcc compiler
 - understand the linking phase for multifile programs -- symbol resolution, nm command
- Basics of procedural programming
 - top-down design -- using functions
 - variable scope -- global vs. local
 - designing good interfaces
 - pass by value vs. pass by reference
- Pointers
 - referencing and dereferencing
 - pointers-to-pointers, pointers-to-pointers-to-pointers, etc.
 - dynamic memory management (malloc and free)
 - pointers to abstract types (very important!)
 - relationship between pointers and arrays
 - pointers to functions
- abstract data types
 - structs
 - unions
 - enums
 - typedefs
(at the very least they must understand, given a library function with an interface in terms of abstract types, how to declare the appropriate variables and call the function. This can be tested easily).
- basic c-unix interaction
 - redirection
 - pipes
- file i/o

OR

- Very good understanding of design cycle on Unix systems.
- Must understand abstract data types in some language (classes, records, user-defined types, structs, ...).
- Must understand references vs. copies in whatever language -- pass by reference vs. pass by value, etc.
- Must understand variable scoping in some language -- global vs. local. Must understand use of functions in top-down design -- building good interfaces, source code organization, etc.
- Must have written at least one small program (at least a few thousand lines) in whatever language.

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GENERAL TERMS AND CONDITIONS

The Department of Computer Science reserves the right to decline your waiver petition. The Department of Computer Science reserves the right to request that you produce documentation in support of your claims herewith. Such documentation includes but is not limited to college transcripts or placement examinations and interviews. Establishing the proficiency that you attest herewith by auditing or sitting in the immersion courses is not permitted.

SIGNATURE

I attest that I have read and understood the requirements, terms, and conditions for this waiver. I am fluent in the topics described above and I request a waiver for:

Immersion Math I Immersion Math II Immersion Programming Both Math and Programming

*In the space below please provide a brief explanation about your background that supports your petition for an **immersion math waiver** (for example indicate if you took similar courses in college before, or had certification training, etc. Please do indicate locations and dates of related activities).*

*In the space below please provide a brief explanation about your background that supports your petition for an **immersion programming waiver** (for example indicate if you took similar courses in college before, or had certification training, etc. Please do indicate locations and dates of related activities).*

Your full name:

Your email address:

Date:

Your signature:

Please complete all fields above