

COMPUTER SCIENCE

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Professors:

Cohen, Epstein, Negoita, Teller, Zamfirescu

Associate Professors:

Schaffer, Shankar, Weiss

Assistant Professors:

Sakas, Stamos

Lecturer: Schweitzer

Advisers: See schedule outside 1008 Hunter North

HEGIS Code: 0701

Majors Offered	Number Credits	Recommended Required GER	Prereq	Recommended Minor
BA in Computer Science	39+14 credits in mathematics and statistics* *Note: the 14 credits in mathematics and statistics required for the major can, instead, be taken as the minor.	Consult adviser	CSCI 135 Software Analysis & Design I With a grade of C or better	See below for descriptions of suggested specific 12-credit minors in economics, film and media studies, and geography; the 14 credits in math and statistics can also be taken as the minor.

The Department of Computer Science provides students with outstanding preparation both for employment as computer professionals and for graduate study. Students use a broad spectrum of programming languages and machine architectures and are expected to construct creative solutions to challenging problems in a variety of contexts. In addition, students are educated in the mathematics of computer science — the theoretical foundations that support current technology and will guide its future development.

Students may work with faculty who engage in research, publish books and articles in highly respected journals and receive grants to pursue significant research. Adjunct faculty are highly competent professionals in a variety of specialized technical fields. The department takes an active interest in students' goals and provides extensive advising and guidance.

MAJOR

The Computer Science major consists of 39 credits in CSCI courses and a collateral 14 credits in MATH courses.

Preliminary Course

Before being permitted to enter computer science as a major, a student must complete CSCI 135 Software Analysis & Design I with a grade of C or better. Students planning to pursue a computer science major are strongly encouraged to declare their major as soon as possible after completing CSCI 135 and to seek help from a faculty adviser for assistance with individual curriculum planning.

Required Courses

All computer science majors must complete successfully the following courses with a grade of C or better:

- CSCI 145 Computer Architecture I
- CSCI 150 Discrete Structures
- CSCI 235 Software Design & Analysis II
- CSCI 245 Computer Architecture II
- CSCI 265 Computer Theory I
- CSCI 335 Software Design & Analysis III
- CSCI 340 Operating Systems
- CSCI 345 Computer Architecture III
- MATH 150 Calculus I
- MATH 155 Calculus II
- MATH 160 Matrix Algebra
- STAT 213 Applied Statistics

Electives

In addition to the preliminary and required courses, each major must complete 15 hours of elective credits from 300-level and 400-level courses with a grade of C or better. At least 12 elective credits must be in classes other than CSCI 391, 392 and

393. With departmental permission, certain appropriate upper-level electives from other academic departments may be substituted.

Minors for Computer Science Majors

Because there is such a broad spectrum of interests among computer science majors at Hunter, the department does not mandate one particular minor. In the past, our majors have minored in fields as diverse as psychology, archaeology and Japanese. There are, however, several minors which combine with the computer science major in very practical ways:

Math/Stat The four collateral courses in Mathematics/Statistics which are required of computer science majors (MATH 150, MATH 155, MATH 160 and STAT 213) comprise an automatic minor and many of our majors choose this option.

Geographic Information Systems (GIS) This is a new and very much in-demand field, and a GIS minor combined with a computer science major can lead to careers dealing with weather, climate, the environment, and other topics of global importance. Two tracks offer different perspectives on the field:

- Remote Sensing (GTECH 321, 322, 361 and one of GTECH 362, 380 or 385) emphasizes the role of computer technology in GIS today.
- Geographic Information Science (GTECH 321, 361, 362 and 385) focuses on the theory and practice of GIS including applications to human and physical geographic problems.

Multimedia Studies Two tracks in this field combine well with a computer science major:

- Web Technology: (MEDIA 161, 180, MEDP 285 and MEDP 331, or MEDIA 399.99) makes an excellent minor for computer science majors

who have an artistic flair and a creative imagination.

- Film and Video Editing: (MEDIA 151, 180, MEDP 281 or 282, and 311) is the perfect minor for computer science majors interested in the technical end of the magical world of film-making.

Corporate Finance A minor in economics (ECO 200, 271, 365 and one of 272, 355, 366, or 360) provides the skills computer science majors need for careers in the financial services industry.

Minor for Non-Majors:

The minor consists of at least 12 credits. Course selections for the minor should be discussed with your major adviser and adhere to the following guidelines:

- Neither CSCI 120 nor CSCI 127 may be used toward the computer science minor
- CSCI 135 must be part of the minor
- All prerequisites must be fulfilled for any CSCI course. The only exception is a written waiver from the instructor.

Students should consult their major adviser to determine appropriate courses. However, the Computer Science department suggests the following sequences: CSCI 135, 235, 335 and 435 (programming track); CSCI 135, 145, 245 and 345 (architecture track)

Please note: Computer Science majors cannot choose computer science for their minor.

Honors

To graduate from Hunter College with honors in computer science, a student must have at least a 2.7 GPA overall and a 3.5 GPA or better in computer science/math and a grade of A in one of the CSCI 493 series of courses.

Recommended course sequence for entering freshmen without credit for pre-calculus and without prior computer programming experience:

Term 1 MATH 125; CSCI 127
 Term 2 CSCI 135; MATH 150
 Term 3 CSCI 145; CSCI 150
 Term 4 CSCI 235; MATH 155
 Term 5 CSCI 245; CSCI 335; MATH 160
 Term 6 CSCI 265; CSCI 345; STAT 213
 Term 7 CSCI 340; 2 CSCI electives
 Term 8 3 CSCI electives

Students with both credit for pre-calculus and prior computer programming experience can begin with Semester 2.

Recommended course sequence for students with transfer credit for CSCI 135, 145 and 150, and MATH 150 and 155:

Term 1 CSCI 235; CSCI 245; MATH 160
 Term 2 CSCI 335; CSCI 265; STAT 213
 Term 3 CSCI 340; 2 CSCI electives
 Term 4 CSCI 345; 3 CSCI electives

The “one repeat” rule is in effect for all courses to be used toward the major, from CSCI 135 through the 400-level courses. This means that if a student fails a CSCI major course once (failure = D, F, NC, WU), that student will have only one more chance to pass the course.

In addition, the Computer Science department will not accept a CR grade in any of the preliminary or required courses for the major (CSCI 135, 145, 150, 235, 245, 265, 335, 340, 345). Any student wishing to declare Computer Science as a major who has received a grade of CR in any of the CSCI courses listed above, must ask the instructor of that course to change the CR grade to the appropriate letter grade. This must be done before the declaration of major form can be authorized.

Please note: A grade of “D” is not considered a passing grade by this department for any of the computer science or math courses required for the major.

COURSE LISTINGS**CSCI 115 Computer Technology in Childhood Education**

Open only to students in QUEST program. Students learn to use a number of software tools and applications that can be infused into the curriculum of the elementary school. Includes a focus on information retrieval using Internet resources and use of such application packages as Microsoft Excel, Microsoft Power Point, Inspiration and Timeliner.

pre- or coreq: QSTA 400
 3 hrs (1 lec, 2 lab), 2 cr.

CSCI 120 Introduction to Computers
GER 2/E

Intended for non-majors. Basic concepts of computer technology. Principles of hardware operation, software and networking. Roles of computers in society, including ethical and legal issues.

prereq: English and Math proficiency
 3 hrs, 3 cr.

CSCI 127 Introduction to Computer Science
GER 2/E

A technical introduction to computer science. Organization of hardware, software, information and an introduction to programming. This course is meant for: potential computer science majors who may not be prepared for CSCI 135; science majors who need some basic computer knowledge; and non-CSCI majors who want a more rigorous introduction to the field than CSCI 120 provides. May not be used toward the CSCI major or minor.

prereq: MATH 121, 125 or 150
 3 hrs, 3 cr.

CSCI 135 Software Analysis and Design I

This first course for prospective computer science majors and minors concentrates on problem-solving techniques using a high-level programming language. The course includes a brief overview of computer systems.

prereq: CSCI 127 or equivalent
 3 hrs, 3 cr.

CSCI 145 Computer Architecture I

Organization of computer systems and design of system elements, including ALU, memories and interfaces. Some assembly language programming.

prereq: CSCI 135
 3 hrs, 3 cr.

CSCI 150 Discrete Structures

Mathematical background required for computer science. Sets, relations, cardinality, propositional calculus, discrete functions, truth tables, induction, combinatorics.

prereq: MATH 121, 125, 150 or 155
 3 hrs, 3 cr.

CSCI 181, 182, 183 Independent Workshop

Outside internship in practical aspects of computing; e.g., systems programming, biomedical computing, computer-aided instruction. Credits may not be used toward the computer science major.

prereq: declared computer science major with 18 credits completed in the department
 1-3 hrs, 1-3 cr.

CSCI 235 Software Analysis and Design II
GER 3/B

Representation of information in computers, including process and data abstraction techniques. Topics covered include static and dynamic storage methods, lists, stacks, queues, binary trees, recursion, analysis of simple algorithms and some searching and sorting algorithms.

prereqs: CSCI 135, 150; MATH 150
 3 hrs, 3 cr.

CSCI 245 Computer Architecture II
GER 3/B

Boolean algebra, data representation, combinational circuits and minimization, sequential circuits.

prereqs: CSCI 145, CSCI 150, MATH 150
 3 hrs, 3 cr.

CSCI 265 Computer Theory I
GER 3/B

Recursion, regular sets, regular expressions, finite automata, context-free grammars, pushdown automata.

prereqs: CSCI 245, MATH 150
 3 hrs, 3 cr.

CSCI 335 Software Analysis and Design III
GER 3/B

The design and analysis of various types of algorithms, including searching, sorting, graph and tree algorithms. Problem-solving techniques. Worst and average case behavior analysis and optimality. Polynomial time complexity classes and theory, including NP-completeness.

prereqs: CSCI 235, MATH 155
 3 hrs, 3 cr.

CSCI 340 Operating Systems
GER 3/B

Definition of functions and components of operating systems. Survey of contemporary multiprocessing/multiprogramming systems. Exploration of systems programs: their design, internal structure and implementation.

prereqs: CSCI 235, 245; MATH 155, STAT 113 or 213
 3 hrs, 3 cr.



CSCI 345 Computer Architecture III

GER 3/B

High performance computer architectures, including massively parallel SIMD and MIMD machines and distributed architectures.

prereqs: CSCI 245, MATH 155

3 hrs, 3 cr.

CSCI 350 Artificial Intelligence

GER 3/B

A survey of artificial intelligence including search and control, knowledge representation, logic and theorem proving, learning, natural language and AI programming.

prereq: CSCI 235

3 hrs, 3 cr.

CSCI 355 Introduction to Linear Programming

GER 3/B

Introduction to operations research and game theory. Simplex method; inconsistency, redundancy and degeneracy problems; two-phase method; duality; transportation problems.

prereqs: CSCI 235, MATH 160

3 hrs, 3 cr.

CSCI 365 Computer Theory II

GER 3/B

Turing machines, Post machines, Post's theorem, Minsky's theorem. Determinism and non-determinism. Undecidability, the halting problem.

Recursive function theory.

prereq: CSCI 265

3 hrs, 3 cr.

CSCI 385 Numerical Methods I

GER 3/B

Accuracy and precision, convergence, iterative and direct methods. Topics selected from: solution of polynomial equations and linear systems of equations, curve fitting and function approximation, interpolation, differentiation and integration, differential equations. Cross-listed as MATH 385 and PHYS 385.

prereqs: CSCI 135, MATH 160

CSCI 391, 392, 393 Independent Study in Computer Science

GER 3/B

Independent work, under the direction of a faculty member, in practical aspects of computing. CSCI 391 is repeatable up to a total of 6 credits; however, no more than a total of three

Independent Study credits may be used toward the computer science major.

prereqs: declared Computer Science major,

perm instr. and dept.

1-3 hrs, 1-3 cr.

CSCI 395 Topics in Computer Science

GER 3/B

Topics include internet security, web programming, genetic algorithms, expert systems and others. Prerequisites vary with specific topics and are announced prior to registration.

3 hrs, 3 cr.

CSCI 405 Software Engineering

GER 3/B

Problems in large-scale software development including functional analysis of information processing systems, system design concepts, timing estimates, documentation and system testing.

prereq: CSCI 335

3 hrs, 3 cr.

CSCI 415 Data Communications and Networks

GER 3/B

A broad technical introduction to the components, protocols, organization, industry and regulatory issues that are fundamental to the understanding of contemporary computer networks.

prereqs: CSCI 335, 340

3 hrs, 3 cr.

CSCI 435 Data Base Management

GER 3/B

Hierarchical and network databases; theory of relational databases; normalization theory; query languages.

prereq: CSCI 335

3 hrs, 3 cr.

CSCI 450 Language Translation

GER 3/B

The theory and application of language recognition and analysis techniques, as they pertain to both formal programming languages and to natural languages. Includes lexical, syntactic and semantic analysis methods, as well as discussions of efficient data representation.

prereqs: CSCI 265, 335

3 hrs, 3 cr.

CSI 460 Advanced Programming Languages

GER 3/B

Survey course on the design and implementation of modern programming languages. Includes object-oriented, functional, logic and concurrent/distributed paradigms.

prereq: CSI 265, 335

3 hrs, 3 cr.

CSCI 485 Numerical Methods II

GER 3/B

Advanced topics selected from: solution of equations and systems of equations, curve fitting and function approximation, interpolation, differentiation and integration, differential equations.

Major project will be assigned. Cross-listed as MATH 485 and PHYS 485.

prereq: CSCI 385

3 hrs, 3 cr.

CSCI 493 Honors Seminar

GER 3/B

Topics include Unix tools, computer law, 3D vision, Windows programming, neural networks, speech and language processing, fuzzy systems and other areas. Prerequisites vary with specific topics and are announced prior to registration.

3 hrs, 3 cr.

The Following Course Will Not Be Offered 2004-2007:**CSCI 450 Language Translation**