CPSC 151 Fundamentals of Computer Science I 5
Introduction to the fundamentals of computer science, including programming in a modern high-level language with emphasis on programming design and style. Algorithm development, stepwise refinement, control structures, functions, elementary search, algorithms, primitive and aggregate data types. Prerequisite: MATH 120.
CPSC 152 Fundamentals of Computer Science II 5
Continuation of the introduction to the fundamentals of computer science, including string processing, recursion, internal searching and sorting, abstract data types (ADT's), such as stacked, queues, linked lists and binary trees. Prerequisite: C (2.0) or better in CPSC 151.
CPSC 191-3 Special Topics 1 to5
CPSC 210 Foundations of Computer Science 5
Introduction to logic, digital logic design and other applications of of logic to computer science, functions, combinatorics, equivalence relations, methods of proof, induction, recurrence relations and recursion in programing languages, graphs, graph implementations and applications. Prerequisites: MATH 135 and a C (2.0) or better in CPSC 152
CPSC 250 Data Structures 5
Abstract data types. Big-Oh notation. Binary search trees, tree balancing techniques, and hash tables. Additional topics may include heaps, priority queues, hash functions, external searching and sorting, and graph algorithms. Prerequisite: C (2.0) or better in CPSC 152.
CPSC 251 Introduction to Computer Organization 5
Basic concepts of digital logic design, computer hardware (CPU components, memory hierarchies, I/O, interrupts), data representation (integer and floating point, characters, arrays, and structured data), Instruction Set Architecttures (design trade-offs, RISC vs CISC, assembly language and machine language, realizations of high-level language constructs). Implementation via programming in an assembly language. Prerequisite: a C (2.0) or better in the following: CPSC 152.
CPSC 291-3 Special Topics 1 to5
CPSC 296 Directed Study 1 to 5
CPSC 308 Technical Communications 3
Communication skills for computer professionals. Writing, speaking, electronic communication. Structure and content of software documentation. CS Majors are to take this course concurrently with CPSC 487, the first quarter of the capstone software project course. Prerequisite: C (2.0) or better in CPSC 250, and ENGL 110. (fall)
CPSC 310 Design and Analysis of Algorithm 5
Advanced data structures (e.g. sets, graphs, priority queues) and their application; algorithm analysis and design techniques, such as divide and conquer, greedy methods, branch and bound, etc. Asymptotic analysis of algorithms and introduction to computability theory. Prerequisites: MATH 222 or 310 and C (2.0) or better in CPSC 250
CPSC 315 Languages and Computation 5
Common features, organization and tradeoffs of modern programming languages including semantics, garbage collection and memory management, and type systems. Theoretical foundations of languages and computation including regular expressions, language classification, grammars and finite state automata. Programming using scripting languages and functional languages. Prerequisite: C (2.0) or better in CPSC 250.
CPSC 320 Object-Oriented Development 5
Fundamentals and principles of object-oriented development, including classes, containment, inheritance, overloading and polymorphism. Object-oriented analysis, design and programming. Prerequisite: C (2.0) or better in CPSC 250.
CPSC 341 Operating Systems and Networks 5
Basic concepts of operating systems from an applications programming perspective include processes, process scheduling, threads, deadlock, synchronization, and security. Introduction to networking including layering of network protocols, client-server programming and network security. Prerequisites: A C (2.0) or better in CPSC 250 .
CPSC 370 Fundamentals of Databases I 5
Introduction to database management systems, architecture, and environment. Relational database design including data modeling and schema design. Coverage of SQL query language for application development. Overview fundamental concepts of transaction managemennt, security and recovery control. Prerequisite: a C (2.0) or better in CPSC 250.
CPSC 391-3 Special Topics 1 to 5
CPSC 396 Directed Study 1 to 5
CPSC 422 Design Patterns 5
Categorization of standard design patterns, their use, expected benefit(s) and associated cost(s). Explication and analysis of creational, interface, structural and behavioral patterns. Prerequisite: C (2.0) of better in CPSC 320.

Please Note: These course descriptions are not a complete listing of courses offered by the Computer Science/Software Engineering department. These descriptions are of courses most typical for completion of an undergraduate CS degree . For a complete list of course descriptions, please consult the Seattle University Undergraduate and Graduate Bulletins of Information.

CPSC 434 Software Testing and Debugging 5
Overview of testing and debugging principles. Topics include program analysis, testing adequacy, functional testing, structural testing, unit testing, integration testing, and systematic debugging. Prerequisites: A C (2.0) or better in one 300-level CPSC course and either MATH 222, MATH 310, or a C (2.0) or better in CPSC 210.
CPSC 444 Concurrent & Distributed Systems 5
Fundamentals of concurrent programming including: identification of race conditions and standard methods of prevention; correctness of concurrent programs; mutual exclusion; concurrent constructs such as threads, semaphores, monitors, rendezvous add remote procedural calls; and classic concurrent problems such as the reader-writer problem, the producer-consumer problem. Prerequisite: C (2.0) or better in CPSC 341.
CPSC 460 Computer Networks 5
The principles of networking, client and server programming, with emphasis on the TCP/IP protocol suite upon which the Internet is based. Examples may include packet-switched networks, layering of network protocols, ethernet, telnet, FTP, HTTP, etc. Prerequisites: C (2.0) or better in CPSC 341.
CPSC 465 Computer Graphics 5
Fundamentals of computer graphics. Techniques of computer image synthesis. Line-drawing and color raster graphics. Homogeneous coordinates, hidden line and surface, and smooth shading algorithms. Prerequisite: MATH 222 or 310 and a C (2.0) or better in CPSC 250
CPSC 470 Artificial Intelligence 5
Principal ideas and developments in AI, including knowledge representation, goal-directed problem solving, optimal and sub-optimal search, theorem proving, pattern matching. Additional topics may include expert systems, neural nets, simulated annealing, genetic algorithms. Prerequisite: C (2.0) or better in CPSC 310 and CPSC 380.
CPSC 471 Fundamentals of Databases II 5
A continuation of the CPSC 370 course. Topics include advanced data models including the enhanced entity relationship model, object-oriented and object-relational data models, physical data storage in database systems, transaction processing, concurrency control, recovery techniques, query processing and optimization, database security and authorization, and more advanced application programming for database systems covered in the 370 course. Prerequisite: C (2.0) or better in CPSC 370.
CPSC 481 User-Centered Web Design 5
An introduction to web site design with emphasis on the area of human computer interaction (HCI). Topics include defining the audience, planning the site, prototyping and testing the design. HCI topics include an introduction to cognitive psychology, user-cenerted design methodology and memory characteristics as pertains to interface design. Technical aspects of creating a site include basic text markup, scripting languages and other web tools. Core Interdisciplinary course See Undergraduate Bulletin of Information for full description Cannot be used as a CPSC 400 level elective. Prerequisite: PHIL 110
CPSC 482 Computer Games: Design & Effect 3
Core Interdisciplinary course See Undergraduate Bulletin of Information for full description Cannot be used as a CPSC 400 level elective. Pre/Corequisite ENGL 120
CPSC 483 CyberSecurity 3
Core Interdisciplinary course See Undergraduate Bulletin of Information for full description Cannot be used as a CPSC 400 level elective
CPSC 485 Compiler Principles & Techniques 5
Lexical analyzers, top and bottom-up parsing and LL (k), LR, etc. grammars, symbol tables, internal forms and intermediate languages, code generation, code optimization, semantic specifications, error detection and recovery, comparison methods. Use of software tools for lexical analysis and parsing. Prerequisites: C (2.0) or better in CPSC 251 and CPSC 315.
CPSC 487(6) Software Engineering Project I 5
Meets regularly in the fall quarter to cover the principles of software engineering, and to initiate software project activities. Prerequisite: C (2.0) or better in CPSC 310, 320, 370, and 380 and a major GPA of 2.5 or higher. Co-requisite: CPSC 308 to be taken concurrently. (fall)
CPSC 488-9 Software Engineering Project II & III 3
Prerequisite for 488: C (2.0) or better in 487. Prerequisite for 489: C (2.0) or better in 488. Principles of software engineering and their application in the planning and execution of a three-quarter-long software development project. Students work in teams to define and carry out software projects from initial requirements statements to final implementation. Activities include project planning and management, as well as analysis, design and implementation of the software project. In 487 projects are defined and requirements specifications developed by the teams. The required software products are then designed and implemented in 488 & 489, culminating in a formal presentation of results at the end of the spring quarter. CPSC 487, 488, and 489, must be taken as a continuous sequence and together, they fulfill the senior synthesis core requirement.
CPSC 491-3 Special Topics 1 to 5
CPSC 496 Independent Study 1 to 5
CPSC 497 Directed Reading 1 to 5
CPSC 498 Directed Research 1 to 5

COMPUTER SCIENCE AND SOFTWARE ENGINEERING

Objectives

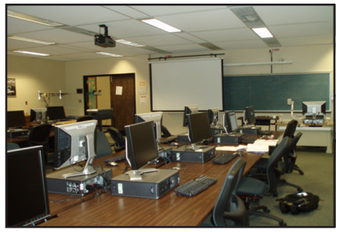
The computer science program seeks to prepare students for careers that require sophisticated programming and computer applications in industrial, scientific, technical or educational settings, and to incorporate into the program the principles and techniques of software engineering. The program provides solid foundations for understanding the changing roles of computers in society and encourages students to apply their knowledge to solving a variety of problems through laboratory and project activities.

Recognizing that different people study computer science for different reasons, the department offers both bachelor or science and bachelor of arts degrees. The bachelor of science in computer science (BSCS) degree program provides a rigorous background appropriate for a career in software development or for entry into graduate study in computer science. A general option is available, as well as two specializations, mathematics and business. These specialized options within the BSCS degree program enable students to develop greater interdisciplinary expertise which will better equip them for jobs demanding such skills in the workplace.

The bachelor of arts (BA) degree program offers a sound foundation in computer science courses, while allowing greater flexibility in determining an area of application of the acquired computing skills. It is an excellent preparation for students interested in professional careers involving computer applications in less technical areas such as business or education.

Both the BSCS and BA degree programs require that all students complete a capstone experience, the yearlong senior software engineering project which requires students to work in small groups to complete a substantial software system project, working with a faculty advisor and a sponsoring organization from business or industry.

In addition to the bachelor's degree programs, the department offers a computer science minor.



SEATTLE UNIVERSITY

Seattle University was founded in 1891 by Jesuit priests. As one of 28 Jesuit colleges in the United states, we are dedicated to teaching and educating for leadership and service. While we have grown to be the largest independent institution in the Pacific Northwest, we still enjoy a small-college atmosphere that balances academic challenges with personal, individual attention. We offer a diverse and quality curriculum to students of every religion and culture, and our faculty members are committed to a strong student-teacher relationship.

Degrees Offered

Bachelor or Arts
Bachelor of Science in Computer Science
Master of Software Engineering

Majors Offered

Computer Science
Computer Science with Specialization in Mathematics
Computer Science with Specialization in Business

Minor Offered

Computer Science

Departmental Requirements

A grade of C (2.0) is required in all CSSE courses that are prerequisites to other CSSE courses. Only courses graded C (2.0) or higher may be transferred to satisfy degree requirements. Both the cumulative grade point average and grade point average for major/department courses completed at Seattle University must be at least 2.5 for graduation. Transfer credits require departmental approval. The MATH 134,135, 136 sequence can be fulfilled by any three quarter or two semester calculus sequence from which Seattle University accepts the first course or courses as substitutes for MATH 134 and 135.

Faculty

Richard LeBlanc, PhD, University of Wisconsin, Chair
Lirong (Annie) Dai, PhD, University of Texas, Dallas
Adair Dingle, PhD, University of Texas at Dallas
Jeff Gilles, MS University of Iowa
Eric Larson, Phd, University of Michigan
Susan Reeder, MA University of South Dakota
Roshanak Roshandel, PhD, University of Southern California
Yingwu (Jason) Zhu, PhD, University of Cincinnati

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www.seattleu.edu/scieng/comsci

The Program

All Computer Science major tracks require students to complete a minimum of 180 quarter credits with both a cumulative grade point average and a major/department grade point average of 2.5 or better.

The Core requirements are the same for all Major tracks in the department, with exceptions noted.

I. Core Curriculum Requirements

ENGL 110 College Writing: Inquiry and Argument 5
PHIL 110 Introduction to Philosophy and Critical Thinking ...5

Choose one of the following two courses 5
HIST 120 Origins of Western Civilization
HIST 121 Studies in Modern Civilization

ENGL 120 Masterpieces of Literature 5
Lab Science (Except BS General Option)(MATH take PHYS 121) 5
FINR 120 or approved fine arts alternative 5
PHIL 220 Philosophy of the Human Person 5
Social Science I 5
Social Science II (different discipline for Social Science I) 5
Theology and Religious Studies Phase II (200-299) 5
Ethics (upper division) 5
Theology and Religious Studies Phase III (300-399) 5
Interdisciplinary 3
Senior Synthesis filled by CPSC 487 (6), 488, and 489
(See detailed core curriculum information in the SU undergraduate Bulletin)

Bachelor of Arts Major in Computer Science

Bachelor of arts degree students must complete a coordinated group of application area courses. These courses must include at least 30 credits of courses in an area of proposed application of computer science. These 30 credits may be those prescribed for a minor in another department, but may not include any credits already required by the Computer Science Department for the bachelor of arts degree. In areas of application where a minor is not prescribed, the Computer Science department will define the acceptable application area courses, with the assistance of the appropriate departments.

II. Major Requirements

Fifty-nine credits in computer science, including:
CPSC 151 Fundamentals of Computer Science I.....5
CPSC 152 Fundamentals of Computer Science II 5
CPSC 250 Data Structures 5
CPSC 308 Technical Communications 3
CPSC 481 The Art of Web Design 5
CPSC 370 Fundamentals of Database I 5
CPSC 380 Organization of Programming Languages.....5
CPSC xxx CPSC Electives (200 level or higher 15
(10 credits must be 300 level or above, excluding 482-483, 486-489)
CPSC 486 Software Engineering Project 5
CPSC 488 Software Engineering Project II 3
CPSC 489 Software Engineering Project III 3

III. Other Major Department Requirments

Forty-five credits including:
MATH 134 Calculus and Analytic Geometry I.....5
MATH 135 Calculus and Analytic Geometry II 5

Choose one of the following two courses: 5
MATH 244 Fundamentals of Probability and Statistics
MATH 351 Probability
Area of Application 30

Bachelor of Science in Computer Science General Option

The bachelor of science in computer science degree (BSCS) requires students to complete at least 180 quarter credits with both a cumulative grade point average and a major/department grade point average of 2.5 or better.

I. Core Curriculum Requirements

II. Major Requirements

Eighty-four credits in computer science, including:
CPSC 151 Fundamentals of Computer Science I.....5
CPSC 152 Fundamentals of Computer Science II 5
CPSC 210 Foundations of Computer Science I 5
CPSC 250 Data Structures 5
CPSC 251 Introduction to Computer Organization.....5
CPSC 308 Technical Communications 3
CPSC 310 Design & Analysis of Algorithms.....5
CPSC 315 Languages & Computation
CPSC 320 Object-oriented Development.....5
CPSC 341 Operating Systems & Networks 5
CPSC 370 Fundamentals of Database I 5
CPSC 487 Software Engineering Project I.....5
CPSC 488 Software Engineering Project II 3
CPSC 489 Software Engineering Project III 3
CPSC 4xx Electives (400-level) 15

III. Other Major Department Requirements

Thirty-eight credits in mathematics, physics, and science including:
MATH 134 Calculus and Analytic Geometry I.....5
MATH 135 Calculus and Analytic Geometry II 5
MATH 136 Calculus and Analytic Geometry III 5
MATH 233 Linear Algebra 3
PHYS 121 Mechanics 5

Choose two of the following six courses 10
PHYS 122 Electricity and Magnetism
PHYS 123 Waves, Optics & Thermodynamics
BIOL 165 General Biology
BIOL 240 Genetics
CHEM 121 General ChemistryI and Lab 131
CHEM 122 General Chemistry II and Lab 132

Choose one of the following two courses: 5
MATH 244 Fundamentals of Probability and Statistics
MATH 351 Probability

Bachelor of Science in Computer Science with a Specialization in Business

The specialization in business will prepare students for information management or information technology positions, which are increasingly critical in most companies. In addition to computer science requirements (59 credits), the student will take at least 30 credits of business courses through the Albers School of Business and Economics.

I. Core Curriculum Requirements

II. Major Requirements

Fifty-nine credits in computer science, including:
CPSC 151 Fundamentals of Computer Science I 5
CPSC 152 Fundamentals of Computer Science II 5
CPSC 210 Foundations of Computer Science I 5
CPSC 250 Data Structures 5
CPSC 308 Technical Communications 3
CPSC 310 Design & Analysis of Algorithms 5
CPSC 315 Languages & Computation.....5
CPSC 320 Object-Oriented Development.....5
CPSC 481 User-Centered Web Design 5
CPSC 370 Fundamentals of Database I 5
CPSC 487 Software Engineering Project 5
CPSC 488 Software Engineering Project II.....3
CPSC 489 Software Engineering Project III 3
CPSC 4XX Electives 10
(300-level or higher excluding 481-483, 486-489)

III. Business Specialization Requirements

Thirty credit hours in ASBE satisfying one ot the following:

A Minor in Accounting or 30
A Minor in Business Administration or 30
A Minor in Economics or 30
A Minor in International Business or 30
A Minor in Finance.....30
A Minor in Entrepreneurship and Innovation.....30
30 Approved credit hours of upper-level ASBE courses 30

IV. Other Major Department requirements

Twenty-eight credits including:
MATH 134 Calculus and Analytic Geometry I 5
MATH 135 Calculus and Analytic Geometry II.....5
Three Credit Elective 3

Choose one of the following two courses: 5
ECON 260 Business Statistics
ECON 271 Quantitative Methods and Applications

Please Note: 1. Each student must complete a business specialization in Accounting, Business Administration, Economics or International Business, by completing the courses specified by the ASBE for these minors in the chosen area of specialization. Students should be aware that the ASBE does not allow students completing this program to also minor in Business Adminsitration. 2. BSCS business specialization students must meet all prerequisites for courses taken and must be at least at junior standing when enrolled in 300/400 level courses from the Albers School of Business and Economics. 3. Business courses are subject to the same grade minimums as for Business Administration majors. 4. The total number of business credits, prerequisite plus required credit hours in business cannot exceed 24% of a student's total credit hours (ECON 260, ECON 271, ECON 310 do not count as business hours).

Bachelor of Science in Computer Science with a Specialization in Mathematics

This specialization requires students to take 64 credits in computer science and 50 credits in mathematics, and any three credit elective. The combination of mature skills in applied mathematics and strong computer applications skills is a rare and valuable combination.

I. Core Curriculum Requirements

II. Major Requirements

64 credits in computer science, including:
CPSC 151 Fundamentals of Computer Science I.....5
CPSC 152 Fundamentals of Computer Science II 5
CPSC 250 Data Structures 5
CPSC 251 Introduction to Computer Organization.....5
CPSC 308 Technical Communications 3
CPSC 310 Design & Analysis of Algorithms.....5
CPSC 315 Languages and Computation 5
CPSC 320 Object-oriented Development.....5
CPSC 341 Operating Systems & Networks 5
CPSC 350 Theoretical Computer Science.....5
CPSC 370 Fundamentals of Database I 5
CPSC 487 Software Engineering Project 5
CPSC 488 Software Engineering Project II 3
CPSC 489 Software Engineering Project III 3
CPSC 4XX Elective (400 level excluding 481-483, 486-487) ...5
Any Seattle UniversityThree Credit Elective 3

III. Mathematics Specialization Requirements

Fifty credits in mathematics courses, including:
MATH 134 Calculus and Analytic Geometry I.....5
MATH 135 Calculus and Analytic Geometry II 5
MATH 136 Calculus and Analytic Geometry III 5
MATH 232 Multivariable Calculus 3
MATH 233 Linear Algebra 3
MATH 234 Differential Equations.....4

Choose one of the following two courses: 5
CPSC 210 Foundations of Computer Science I
MATH 310 Intro to Advanced Mathematics

Choose one of the following two courses: 5
MATH 244 Fundamentals of Probability and Statistics
MATH 351 Probability

Choose three of the following four courses:: 15
MATH 361 Applied Mathematics I
MATH 331 Introduction to Complex Variables
MATH 371 Introduction to Numerical Methods
MATH 461 Applied Mathematics II

Minor in Computer Science

In order to earn a minor in computer science, students must complete 30 quarter credits in computer science.
CPSC 151 Fundamentals of Computer Science I.....5
CPSC 152 Fundamentals of Computer Science II 5
CPSC 250 Data Structures 5
Choose 5 credits from:
CPSC 315 Languages & Computation 5
CPSC 320 Object-Oriented Development.....5
Choose 10 credits from 300 and 400 level Computer Science electives. See Undergraduate Bulletin of Information or web site for specific offerings.

See policy for minors in the Undergraduate Bulletin