Undergraduate Computer Science Program

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https://www.csd.cs.cmu.edu/academics/undergraduate/overview

The B.S. program in Computer Science combines a solid core of Computer Science courses with the ability to gain substantial depth in another area through a required minor in a second subject. In addition, the curriculum provides numerous choices for science, engineering, humanities and fine arts courses. As computing is a discipline with strong links to many fields, this provides students with unparalleled flexibility to pursue allied (or non-allied) interests.

Students apply to, and are directly admitted into, the School of Computer Science. Admitted students may choose to pursue an undergraduate degree in Computer Science and, upon successful completion, are awarded a Bachelor of Science in Computer Science. Suitably prepared students from other Carnegie Mellon colleges are eligible to apply for internal transfer to the School of Computer Science and will be considered for transfer if grades in core CS requirements are sufficiently high and space is available.

Students in the B.S. program in Computer Science are expected to acquire the following skills upon graduation:

- Identify, use, design, develop and analyze appropriate abstractions and algorithms to solve problems while being able to prove the algorithm's performance and correctness across a variety of metrics (e.g., time, space, parallel vs. sequential implementation, what is computable).
- Implement solutions to problems in application areas such as machine intelligence, graphics, vision, and human-computer interaction, by applying the fundamentals of those areas to create solutions to current problems while being exposed to research developments that will enable them to adapt as the technology changes.
- Reason about and implement programs in various programming languages and paradigms
- Describe, specify, and develop large-scale, open-ended software systems subject to constraints such as performance and/or resource issues
- Communicate technical material effectively to technical and non-technical audiences
- Work both individually and in teams
- Recognize the social impact of computing and the attendant responsibility to consider the legal, moral and ethical implications of computing technologies.

Due to the tremendous number of ongoing research projects within the School, many students obtain part-time or summer jobs, or receive independent study credit, working on research while pursuing their undergraduate degree. Students seeking a research/graduate school career may pursue an intensive course of research, equivalent to four classroom courses, culminating in the preparation of a senior research thesis.

SCS also offers a B.S. degree in Computational Biology and a Bachelor's Degree in Computer Science and the Arts (jointly with the College of Fine Arts). More detail about the Computational Biology major and the Computer Science and the Arts program is available in separate sections of the Undergraduate Catalog. SCS offers additional majors in Computer Science (for non-CS majors), Human-Computer Interaction, and Robotics, and minors in Computational Biology, Computer Science (for non-CS majors), Human-Computer Interaction, Language Technologies, Machine Learning, Neural Computation, Robotics, and Software Engineering. Information about additional majors and minors in SCS besides those in Computer Science are listed in a separate section in the Undergraduate Catalog.

Curriculum - B.S. in Computer Science

Computer Science

The following requirements are for students entering Fall 2017.

Computer Science Core (all of the following):		Units
15-128	Freshman Immigration Course	1
15-122	Principles of Imperative Computation (students with no prior programming experience take 15-112 before 15-122)	10
15-150	Principles of Functional Programming	10
15-151	Mathematical Foundations for Computer Science (if not offered, substitute 21-127)	10
15-210	Parallel and Sequential Data Structures and Algorithms	12
15-213	Introduction to Computer Systems	12
15-251	Great Ideas in Theoretical Computer Science	12
15-451	Algorithm Design and Analysis	12

One Algorithms/Complexity elective (min. 9 units):		
15-354	Computational Discrete Mathematics	12
15-355	Modern Computer Algebra	9
15-455	Undergraduate Complexity Theory	9
15-456	Computational Geometry	9
21-301	Combinatorics	9
21-484	Graph Theory	9
others as designated by the CS Undergraduate Program		

One Logics/Languages elective (min. 9 units):		
15-312	Foundations of Programming Languages	12
15-314	Programming Language Semantics	12
15-316	Software Foundations of Security and Privacy	9
15-317	Constructive Logic	9
15-414	Bug Catching: Automated Program Verification and Testing	9
15-424	Foundations of Cyber-Physical Systems	12
80-413	Category Theory	9
others as designated by the CS Undergraduate Program		

One Software Systems elective (min. 12 units):		
15-410	Operating System Design and Implementation	15
15-411	Compiler Design	15
15-418	Parallel Computer Architecture and Programming	12
15-440	Distributed Systems	12
15-441	Computer Networks	12
others as designated by the CS Undergraduate Program		

One Applications elective, representing important branches of computer science (min. 9 units):		
02-250	Introduction to Computational Biology	12
05-391	Designing Human Centered Software	12
10-401	Introduction to Machine Learning (Undergrad)	12
or 10-601	Introduction to Machine Learning (Master's)	
11-411	Natural Language Processing	12
15-313	Foundations of Software Engineering	12
15-322	Introduction to Computer Music	9
or 15-323	Computer Music Systems and Information Processing	
15-381	Artificial Intelligence: Representation and Problem Solving	9
15-415	Database Applications	12
15-462	Computer Graphics	12
16-384	Robot Kinematics and Dynamics	12
16-385	Computer Vision	9
others as designated by the CS Undergraduate Program		

Two Computer Science electives:	Units
These electives can be from any SCS department; 200-level or above, at least 9 units each (see exceptions below): Computer Science [15-], Computational Biology Department [02-], Human Computer Interaction Institute [05-], Institute for Software Research [08-,17-], Machine Learning [10-], Language Technologies Institute [11-], and Robotics Institute [16-]. (NOTE: The following undergraduate courses do NOT count as Computer Science electives: 02-201, 02-223, 02-261, 08-200, 08-532, 15-351, 16-223. Some IDEATE courses and SCS graduate courses might not be allowed. Consult with a CS undergraduate advisor before registration to determine eligibility for this requirement.)	18

Mathematics

21-120	Differential and Integral Calculus	10
21-122	Integration and Approximation	10
Plus one of the following Matrix Algebra courses:		
21-241	Matrices and Linear Transformations	10
21-242	Matrix Theory	10
Plus one of the following Probability courses:		
15-359	Probability and Computing	12
21-325	Probability	9

36-3xx	Probability and Mathematical Statistics (To be offered for CS majors starting in 2018. Students entering in 2017 may take 36-217 instead in Fall 2017 or Spring 2018)	9

Technical Communication

One Technical Communications course:		Units
08-200	Ethics and Policy Issues in Computing	9
15-300	Research and Innovation in Computer Science	9
76-270	Writing for the Professions	9

Science and Engineering

Four courses in science and engineering are required, of which at least one must have a laboratory component and at least two must be from the same department.

Non-lab courses that can be taken by Computer Science majors to satisfy this requirement are given in the list below. (Consult your academic advisor for additional choices available each semester.)

02-223	Personalized Medicine: Understanding Your Own Genome (can be paired with a course in Biology 03-xxx for two courses in one department)	9
03-121	Modern Biology	9
03-125	Evolution	9
03-132	Basic Science to Modern Medicine	9
06-100	Introduction to Chemical Engineering	12
06-221	Thermodynamics	9
09-105	Introduction to Modern Chemistry I	10
09-106	Modern Chemistry II	10
09-217	Organic Chemistry I	9
09-218	Organic Chemistry II	9
09-225	Climate Change: Chemistry, Physics and Planetary Science	9
12-100	Introduction to Civil and Environmental Engineering	12
12-201	Geology	9
18-100	Introduction to Electrical and Computer Engineering	12
18-220	Electronic Devices and Analog Circuits	12
18-240	Structure and Design of Digital Systems	12
24-101	Fundamentals of Mechanical Engineering	12
24-231	Fluid Mechanics	10
24-261	Statics	10
24-351	Dynamics	10
33-114	Physics of Musical Sound	9
33-120	Science and Science Fiction	9
33-121	Physics I for Science Students	12
or 33-151	Matter and Interactions I	
33-142	Physics II for Engineering and Physics Students	12
or 33-152	Matter and Interactions II	
33-224	Stars, Galaxies and the Universe	9
42-101	Introduction to Biomedical Engineering	12
42-202	Physiology	9
42-341	Introduction to Biomechanics	9
85-219	Biological Foundations of Behavior (can be paired with a course in Biology 03-xxx for two courses in one department)	9

At present, courses meeting the lab requirement are:

02-261	Quantitative Cell and Molecular Biology Laboratory (can be paired with a course in Biology 03-xxx for two courses in one department)	9
03-124	Modern Biology Laboratory	9
09-101	Introduction to Experimental Chemistry (This 3 unit lab together with 09-105 satisfies the lab requirement.)	3
09-221	Laboratory I: Introduction to Chemical Analysis	12
27-100	Engineering the Materials of the Future	12
33-104	Experimental Physics	9
42-203	Biomedical Engineering Laboratory	9
85-310	Research Methods in Cognitive Psychology	9
85-314	Cognitive Neuroscience Research Methods	9

The following MCS and CIT courses cannot be used to satisfy the Engineering and Natural Sciences requirement:

03-511	Computational Molecular Biology and Genomics	9
03-512	Computational Methods for Biological Modeling and Simulation	9
06-262	Mathematical Methods of Chemical Engineering	12
09-103	Atoms, Molecules and Chemical Change	9
09-231	Mathematical Methods for Chemists	9
12-271	Introduction to Computer Application in Civil & Environmental Engineering	9
18-090	Twisted Signals: Multimedia Processing for the Arts	10
18-200	ECE Sophomore Seminar	1
18-202	Mathematical Foundations of Electrical Engineering	12
18-213	Introduction to Computer Systems	12
18-345	Introduction to Telecommunication Networks	12
18-411	Computational Techniques in Engineering	12
18-482	Telecommunications, Technology Policy & Management	12
18-487	Introduction to Computer Security	12
18-540	Rapid Prototyping of Computer Systems	12
19-101	Introduction to Engineering and Public Policy	12
19-211	Ethics and Policy Issues in Computing	9
19-325	Technology and Policy Writing for Lay Audiences	9
19-402	Telecommunications Technology, Policy & Management	12
19-411	Global Competitiveness: Firms, Nations and Technological Change	9
19-432	Special Topics: Bitcoin and Cryptocurrencies	6
27-410	Computational Techniques in Engineering	12
33-100	Basic Experimental Physics	6
33-115	Physics for Future Presidents	9
33-124	Introduction to Astronomy	9
33-232	Mathematical Methods of Physics	10
39-100	Special Topics: WHAT IS ENGINEERING?	9
39-200	Business for Engineers	9
42-201	Professional Issues in Biomedical Engineering	3

All Electrical and Computer Engineering graduate courses [18-6xx, 18-7xx, 18-8xx, 18-9xx] cannot be used for this requirement. In general, any MCS or CIT courses that are cross-listed with SCS courses or have significant mathematical or computational content cannot be used for this requirement. Consult with a CS undergraduate advisor about any course to be used for the Science and Engineering requirement before registration.

Humanities and Arts

All candidates for the bachelor's degree in Computer Science must complete a minimum of 63 units offered by the College of Humanities & Social Sciences and/or the College of Fine Arts. These courses offer students breadth in their education and perspectives and provide students with a better appreciation of social, artistic, cultural, political and economic issues that can influence their effectiveness as a computer scientist upon graduation.

Requirements for this component of the degree are listed under the SCS main page under General Education Requirements (http://coursecatalog.web.cmu.edu/schoolofcomputerscience/#genedtext).

Required Minor

A sequence of courses proscribed by the requirements of the particular department. Completion of an additional major (or dual degree) also satisfies this requirement. In general, courses taken in satisfaction of the minor or second major may also count toward any general education category in the CS major (i.e. courses outside of the Computer Science and Mathematics requirements). Double counting toward Computer Science and Mathematics courses in the CS major is strictly limited and depends on the chosen minor (or additional major). Consult with a CS undergraduate advisor and an advisor from the department of the minor (or additional major) for specific restrictions on double counting.

Computing @ Carnegie Mellon

The following course is required of all students to familiarize them with the campus computing environment:

99-10x	Computing @ Carnegie Mellon	3

Free Electives

A free elective is any Carnegie Mellon course. However, a maximum of nine (9) units of Physical Education and/or Military Science (ROTC) and/or Student-Led (StuCo) courses may be used toward fulfilling graduation requirements.

Summary of Degree Requirements:

Area	Courses	**Units**
Computer Science	13	**135**
Mathematics	4	**39**
Technical Communication	1	**9**
Science/Engineering	4	**36**
Humanities/Arts	7	**63**
Minor Requirement/Free electives	8	**74**
Computing @ Carnegie Mellon	1	**3**
First Year Seminar	1	**1**
		360

Sample Course Sequence

The sample given below is for a student who already has credit for introductory programming but no credit for calculus. Students with credit for calculus may start with a more advanced math class (e.g. 21-241) in their first year if desired. Students with no credit for introductory programming will take 15-112 in their first semester and shift some CS courses to later semesters after consulting with their academic advisor; these students should still be able to complete their degree in four years given the light load of their senior year. It is recommended that students keep their academic load lighter for their Senior Fall semester to account for offsite job interviews or for their Senior Spring semester to account for visits to graduate schools.

Freshman Year:

Fall		Units
15-122	Principles of Imperative Computation	10
15-128	Freshman Immigration Course	1
15-131	Great Practical Ideas for Computer Scientists (optional, not required for CS major)	2
15-151	Mathematical Foundations for Computer Science (if not offered, substitute 21-127)	10
21-120	Differential and Integral Calculus	10
76-101	Interpretation and Argument	9
99-10x	Computing @ Carnegie Mellon	3
		45

Spring		Units
15-150	Principles of Functional Programming	10
15-251	Great Ideas in Theoretical Computer Science	12
21-122	Integration and Approximation	10
xx-xxx	Science/Engineering Course	9
xx-xxx	Humanities and Arts Elective	9
		50

Sophomore Year:

Fall		Units
15-213	Introduction to Computer Systems	12
21-241	Matrices and Linear Transformations	10
xx-xxx	Science/Engineering Course	9
xx-xxx	Humanities and Arts Elective	9
xx-xxx	Minor Requirement / Free Elective	9
		49

Spring		Units
15-210	Parallel and Sequential Data Structures and Algorithms	12
xx-xxx	Computer Science: Applications Elective	9
xx-xxx	Science/Engineering Course	9
xx-xxx	Humanities and Arts Elective	9
xx-xxx	Minor Requirement / Free Elective	9
		48

Junior Year:

Fall		Units
15-451	Algorithm Design and Analysis	12
xx-xxx	Computer Science: Logic/Languages Elective	9
xx-xxx	Technical Communications Course	9
xx-xxx	Probability Course	9
xx-xxx	Minor Requirement / Free Elective	9
		48

Spring		Units
15-xxx	Computer Science: Systems Elective	12
xx-xxx	Computer Science: Algorithms/Complexity Elective	9
xx-xxx	Humanities and Arts Elective	9
xx-xxx	Minor Requirement / Free Elective	9
xx-xxx	Science/Engineering Course	9
		48

Senior Year:

Fall		Units
xx-xxx	School of Computer Science Elective	9
xx-xxx	Humanities and Arts Elective	9
xx-xxx	Minor Requirement / Free Elective	9
xx-xxx	Minor Requirement / Free Elective	9
		36

Spring		Units
xx-xxx	School of Computer Science Elective	9
xx-xxx	Humanities and Arts Elective	9
xx-xxx	Minor Requirement / Free Elective	9
xx-xxx	Minor Requirement / Free Elective	9
		36

Minimum number of units required for the degree: 360

The flexibility in the curriculum allows many different schedules, of which the above is only one possibility. Some elective courses are offered only once per year (Fall or Spring). Constrained CS electives (algorithms/complexity, logic/languages, systems and applications) may be taken in any order and in any semester if prerequisites are met and seats are available. Constrained electives are shown in the specific semesters in the schedule above as an example only. Students should consult with their academic advisor to determine the best elective options depending on course availability, their academic interests and their career goals. Additionally, the School of Computer Science offers an Additional Major in Human-Computer Interaction and an Additional Major in Robotics, as well as numerous computing-oriented minors available to majors and non-majors alike.

Undergraduate Research Thesis

Students considering going on to graduate school in Computer Science should take a wide variety of Computer Science and Mathematics courses, as well as consider getting involved in independent research as early as possible. This would be no later than the junior year and can begin even earlier. Students interested in graduate school are strongly encouraged to participate in the Undergraduate Research Thesis program. Additionally, graduate CS courses can be taken with permission of the instructor and in consultation with an academic advisor.

The goal of the Undergraduate Research Thesis Program is to introduce students to the breadth of tasks involved in independent research, including library work, problem formulation, experimentation, analysis, writing and speaking. In particular, students write a survey paper summarizing prior results in their desired area of research, present a public poster session in December of their senior year describing their current progress, present their final results in an oral summary in the year-end university-wide Undergraduate Research Symposium (Meeting of the Minds) and submit a written thesis at the end of their senior year. Students work closely with faculty advisors to plan and carry out their research. The SCS Honors Undergraduate Research Thesis (15-599) typically starts in the fall semester of the senior year, and spans the entire senior year. Students receive a total of 36 units of academic credit for the thesis work, 18 units per semester. Up to 18 units can be counted toward CS elective requirements (9 per semester for 2 semesters maximum). Students should prepare their research prospectus (i.e. proposal of work) during the spring semester of their junior year, and students in this program are advised to plan their schedules

carefully to ensure there is ample time to perform the required research for the thesis during the senior year.

Students interested in research are urged to consult with their CS undergraduate advisor and Assistant Dean no later than the end of their sophomore year in order to plan their workload effectively. Students may also consider using Research and Innovation in Computer Science (15-300, 9 units) as their technical communications requirement in their junior year since this course will introduce students to various research projects going on in the School of Computer Science that may lead to a senior thesis. This course leads to a subsequent Research Practicum in Computer Science (15-400, 12 units) that begins to build the foundation for a senior thesis by starting preliminary work toward the thesis.

Dual Degree in Computer Science

Students wishing to pursue a Dual Degree in Computer Science are required to apply in the same way as students wishing to transfer into the Computer Science major. Details are given in the Policies section below. Besides the student's primary degree requirements, a student accepted for Dual Degree in CS is required to complete at least 450 units in total and meet all requirements for the CS major including all general education requirements (humanities/arts and science/engineering). Dual degree students do not need to complete 15-128, and these students will replace 15-151 with either 21-127 or 21-128. Since the CS major requires at least a minor in another area, the student's primary major will substitute for this requirement. Note that the primary major must be completed prior to or at the same time as the dual degree in CS to satisfy the minor requirement; a dual degree in CS cannot be certified if the primary degree is not completed. Students should consult with the Assistant Dean in the CS Undergraduate Office and/or their CS academic advisor to review all requirements, once approved.

Double-Counting Restriction

NEW FOR STUDENTS ENTERING 2017 OR LATER: Students pursuing a Dual Degree in Computer Science must complete all requirements for the CS primary major (except 15-128 which is not required and 15-151 which will be replaced with 21-127 or 21-128). In addition, at least 7 of the 12 computer science requirements (core and electives, not including 21-127/21-128) must not be used toward any other major or minor. Students, especially from interdisciplinary majors or with multiple majors or minors, are urged to consult with the Assistant Dean or Undergraduate Program Coordinator in the CS Undergraduate Office to determine double-counting restrictions specific to their own situations.

Computer Science Additional Major

FOR STUDENTS ENTERING FALL 2017

Students interested in pursuing an additional major in Computer Science should first consult with an advisor in the CS Undergraduate Office. Students are expected to complete the requirements for the CS minor first before continuing on to the additional major. Completion of the CS additional major requires 12 computer science courses (not including 15-110 and 15-112 if needed), 5 mathematics courses, and 1 technical communication course. Students are expected to complete all courses for the additional major with an average QPA of 3.0 or higher.

Declaration for the additional major is allowed only after all math requirements are completed or in progress, and at least 9 of the 12 CS requirements (core and electives) are completed or in progress. Due to high demand, seats in upper-level CS courses are not guaranteed for additional majors so students should plan to be flexible in selecting constrained and general electives. Acceptance to complete a Computer Science additional major is not guaranteed and depends on student performance and seat availability.

The following courses are required for the Additional Major in Computer Science:

Computer Science requirements (12 courses):

Core courses (all are required):		Units
15-122	Principles of Imperative Computation	10
15-150	Principles of Functional Programming	10
15-210	Parallel and Sequential Data Structures and Algorithms	12
15-213	Introduction to Computer Systems	12
15-251	Great Ideas in Theoretical Computer Science	12
15-451	Algorithm Design and Analysis	12

One Algorithms & Complexity elective:		Units
15-354	Computational Discrete Mathematics	12
15-355	Modern Computer Algebra	9
15-455	Undergraduate Complexity Theory	9
15-456	Computational Geometry	9
21-301	Combinatorics	9
21-484	Graph Theory	9
others as designated by the CS Undergraduate Program		

One Logic & Languages elective:		Units
15-312	Foundations of Programming Languages	12
15-314	Programming Language Semantics	12
15-316	Software Foundations of Security and Privacy	9
15-317	Constructive Logic	9
15-414	Bug Catching: Automated Program Verification and Testing	9
15-424	Foundations of Cyber-Physical Systems	12
80-413	Category Theory	9
others as designated by the CS Undergraduate Program		

One Systems elective:		Units
15-410	Operating System Design and Implementation	15
15-411	Compiler Design	15
15-418	Parallel Computer Architecture and Programming	12
15-440	Distributed Systems	12
15-441	Computer Networks	12
others as designated by the CS Undergraduate Program		

One Applications elective, representing important domains of computing:		Units
02-250	Introduction to Computational Biology	12
05-391	Designing Human Centered Software	12
10-401	Introduction to Machine Learning (Undergrad)	12
or 10-601	Introduction to Machine Learning (Master's)	
11-411	Natural Language Processing	12
15-313	Foundations of Software Engineering	12
15-322	Introduction to Computer Music	9
or 15-323	Computer Music Systems and Information Processing	
15-381	Artificial Intelligence: Representation and Problem Solving	9
15-415	Database Applications	12
15-462	Computer Graphics	12
16-384	Robot Kinematics and Dynamics	12
16-385	Computer Vision	9
others as designated by the CS Undergraduate Program		

Math requirements (5 courses):

		Units
All of the following three courses:		
21-120	Differential and Integral Calculus	10
21-122	Integration and Approximation	10
21-127	Concepts of Mathematics	10
Plus one of the following required Matrix Algebra courses:		
21-241	Matrices and Linear Transformations	10
21-242	Matrix Theory	10
Plus one of the following required Probability courses:		
15-359	Probability and Computing	12
21-325	Probability	9
36-3xx	Probability and Mathematical Statistics (To be offered for CS majors starting in 2018. Students entering in 2017 may take 36-217 instead in Fall 2017 or Spring 2018)	9

Technical Communication requirement:

One Technical Communications course:		Units
08-200	Ethics and Policy Issues in Computing	9
76-270	Writing for the Professions	9
15-300	Research and Innovation in Computer Science (seating limited, by permission of instructor only)	9

The CS Undergraduate Office (GHC 4115) will announce if any other electives are approved for the four constrained elective categories above.

Two Computer Science Electives: 18 Units

These electives can be from any SCS department; 200-level or above, at least 9 units each (see exceptions below): Computer Science [15-], Computational Biology Department [02-], Human Computer Interaction Institute [05-], Institute for Software Research [08-,17-], Machine Learning [10-], Language

Technologies Institute [11-], and Robotics Institute [16-]. (NOTE: The following undergraduate courses do NOT count as Computer Science electives: 02-201, 02-223, 02-261, 08-200, 08-532, 15-351, 16-223. Some IDeATe courses and SCS graduate courses might not be allowed. Consult with a CS undergraduate advisor before registration to determine eligibility for this requirement.)

Double-Counting Restriction

NEW FOR STUDENTS ENTERING 2017 OR LATER: Students pursuing an Additional Major in Computer Science must complete all requirements listed above. In addition, at least 7 of the 12 computer science requirements (core and electives) must not be used toward any other major or minor. Students, especially from interdisciplinary majors or with multiple majors or minors, are urged to consult with the Assistant Dean or Undergraduate Program Coordinator in the CS Undergraduate Office to determine double-counting restrictions specific to their own situations.

Computer Science Minor

FOR STUDENTS ENTERING FALL 2017

Students interested in pursuing a minor in Computer Science should first consult with an advisor in the CS Undergraduate Office after completion of the prerequisites, 15-122, 15-150 and at least one of the 200-level required courses. Students are expected to complete all courses for the minor with an average QPA of 2.0 or higher, and no courses used for the minor should have a grade of D.

The following courses are required for the Minor in Computer Science:

Prerequisites:		Units
15-112	Fundamentals of Programming and Computer Science (some students may need to take 15-110 prior to 15-112 for additional preparation)	12
21-127	Concepts of Mathematics	10
Computer Science core courses:		
15-122	Principles of Imperative Computation	10
15-150	Principles of Functional Programming	10
15-210	Parallel and Sequential Data Structures and Algorithms	12
One of the following Computer Science core courses:		
15-213	Introduction to Computer Systems	12
15-251	Great Ideas in Theoretical Computer Science	12
Two additional Computer Science electives, of at least 9 units each:		
CS elective courses must be 15-213 or higher, at least 9-units each. 15-221 and 15-351 cannot be used. One course can be from any SCS department, with prior approval.		18

Note: Students who take 15-213/18-213 or 15-251 as part of another degree are required to replace this requirement in the CS minor with another CS elective (15-xxx) as defined above, for a total of 3 additional CS electives.

Double-Counting Restriction

NEW FOR STUDENTS ENTERING 2017 OR LATER: Students may double-count a maximum of 2 courses for the CS minor (not including the prerequisites) toward all other majors and minors. Students, especially from computing-related majors, interdisciplinary majors or with multiple majors or minors, are urged to consult with the Assistant Dean or Undergraduate Program Coordinator in the CS Undergraduate Office to review double-counting restrictions specific to their own situations.