

REQUIREMENTS FOR BACHELOR OF SCIENCE IN COMPUTER SCIENCE

for students matriculated Fall 2012 or after

To receive the BS degree in computer science, the student must earn a minimum of 127 credit hours, including transfer credits, with an average of at least C (2.0 GPA), and a minimum of a C average in the major program.

A. Credit Requirements - A minimum of 127 semester credits of which:

1. a minimum of 60 credits must be in liberal arts and sciences courses
2. a minimum of 30 credits must be earned in Watson School courses

B. Area Requirements

1. **Communications** 4 credits
 - One course that meets the Binghamton University General Education Composition requirement.
 - CS 301. Ethical, Social and Global Issues in Computing (included in the CS credits below)
2. **Humanities/social science electives**20 credits
3. **Science**12 credits
 - Two course science sequence: BIOL 117 and BIOL 118 or CHEM 107 and CHEM 108 or PHYS 131 and PHYS 132
 - One science elective: chosen from courses that meet the General Education Laboratory Science requirement.
4. **Mathematics**20 credits

<ul style="list-style-type: none"> • MATH 221. Calculus I • MATH 314. Discrete Mathematics (or MATH 330) • One elective chosen from: MATH 304. Linear Algebra MATH 356. Mathematical Modeling MATH 381. Graph Theory 	<ul style="list-style-type: none"> • MATH 222. Calculus II • MATH 327. Probability with Statistical Methods MATH 371. Ordinary Differential Equations MATH 407. Introduction to the Theory of Numbers
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5. **Free electives**14 credits

Four credits must be in humanities, social sciences, engineering, arts and other disciplines, *excluding computer science*, that provide breadth of background. At most 2 credits of activity/wellness may be used as free elective credit.
6. **Computer Science** 57¹ credits

<ul style="list-style-type: none"> • CS 101. Introductory Topics in Computer Science • CS 120. Computer Systems I: Machine Organization² • CS 140. Programming with Objects² • CS 220. Computer Systems II: Arch. and Prog. • CS 240. Data Structures and Algorithms • Four electives chosen from at least two of the following four areas: Software Design CS 328. Internet Programming CS 345. Software Engineering CS 422. Web-Based Programming CS 440. Adv. Topics in OO Programming Programming Languages CS 328. Internet Programming CS 422. Web-Based Programming CS 424. Microcontrollers and Robotics CS 440. Adv. Topics in OO Programming Computer Elements and Architecture CS 338. Introduction to Multimedia Systems CS 346. Enterprise Systems CS 423. Design and Impl. of Embedded Systems CS 424. Microcontrollers and Robotics CS 426. Wireless Sensor Networks CS 428. Computer Networks CS 431. Enterprise Network Security CS 446. Enterprise Systems Management Database and Information Systems CS 338. Introduction to Multimedia Systems CS 432. Database Systems CS 433. Information Retrieval CS 435. Introduction to Data Mining 	<ul style="list-style-type: none"> • CS 320. Computer Systems III: Adv. Computer Arch. • CS 350. Operating Systems • CS 373. Automata Theory and Formal Languages • CS 375. Design and Analysis of Algorithms • CS 471. Programming Languages CS 442. Design Patterns CS 460. Computer Graphics CS 472. Compiler Design CS 442. Design Patterns CS 472. Compiler Design CS 476. Programming Models for Emerging Platforms CS 448. Multimedia Systems CS 451. Systems Programming CS 453. Introduction to Grid Computing CS 457. Introduction to Distributed Systems CS 458. Introduction to Computer Security CS 476. Programming Models for Emerging Platforms CS 480Z. z/VM Virtualization CS 436. Intro to Machine Learning CS 448. Multimedia Systems CS 455. Introduction to Visual Information Processing
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 - **One of the following courses** may be used as a CS elective, if taken for 4 credits. It does not count in any of the above areas:
CS 395. Computer Science Internship
CS 396. Computer Science Co-op

C. General Education Requirements—see the *General Education and Your Watson School Major* handout available in the Watson School Student Services Office.

¹ Credits include the Communications course CS 301

² Students with limited programming experience are recommended to first take CS 110 Programming Concepts and Applications

Supplemental information regarding the BSCS Degree Requirements

The following information supplements that provided in the University Bulletin. It applies to students who matriculated Fall 2011 or after.

All required Computer Science courses, except CS 101, are offered every semester.

Humanities/Social Science – May be filled by courses offered by the Division of Humanities, the Division of Social Sciences, the Psychology Department and HDEV courses offered by the College of Community and Public Affairs. Many of the courses taken to meet the General Education requirements will fulfill the Humanities/Social Science requirement.

Mathematics - Students who are strong in math are encouraged to take MATH 330 (Number Systems) instead of MATH 314 (Discrete Mathematics). Students with a strong math background may take MATH 381 (Graph Theory) as their Math elective, even though they have not taken MATH 304 (Linear Algebra). The following Binghamton University course can be substituted for MATH 327: MATH 448 (Introduction to Probability and Statistics II).

Free Electives – May be filled by extra courses from any of the areas listed above, SOM courses, or additional Computer Science courses. A maximum of 2 PE credits may be counted as Free Elective credits. At least four of these credits must be in humanities, social sciences, arts and other disciplines (excluding computer science) that provide breadth of background. CS 110 counts as a free elective.

SAMPLE SCHEDULE* OF OUR FLEXIBLE FOUR YEAR PROGRAM (ENTERING IN 2012)
UNDERGRADUATE COMPUTER SCIENCE PROGRAM

Freshman Year

Fall Semester

CS 101 Topics in Computer Science
 CS 120 Computer Systems I: Machine Organization **
 MATH 221 Calculus I
 WRIT 111 Coming to Voice
 Social Science/Humanities Elective***

1 credit
 4 credits
 4 credits
 4 credits
4 credits
 17 credits

TOTAL

Spring Semester

CS 140 Programming with Objects **
 MATH 222 Calculus II
 Social Sciences/Humanities Elective***
 Science ****

4 credits
 4 credits
 4 credits
4 credits
 16 credits

TOTAL

Sophomore Year

Fall Semester

CS 220 Computer Systems II: Arch and Programming
 Social Sciences/Humanities Elective***
 MATH 304 or 371 or 381
 Science ****

4 credits
 4 credits
 4 credits
4 credits
 16 credits

TOTAL

Spring Semester

CS 240 Data Structures and Algorithms
 CS 301 Ethical, Social and Global Issues in Computing
 MATH 314 Discrete Mathematics
 Science ****

4 credits
 4 credits
 4 credits
4 credits
 16 credits

TOTAL

* Your schedule over four years may vary considerably from this sample but you must observe course prerequisites. The flowchart for required courses in CS shows which courses must precede others. Students are encouraged to vary this schedule depending on their interests and the CS advisor will be happy to discuss alternatives.
 ** Students with AP credit for Gen ed courses and a strong CS background may take CS 120 and CS 140 in the first semester. Students without prior programming experience should take CS 110 in Fall and either CS 120 or CS 140 in the Spring. Please consult a CS advisor before attempting CS 120 and CS 140 together.
 *** These courses should be selected to fulfill the General Education Composition (C), Global Interdependencies (G), Pluralism (P), Aesthetics (A), Humanities (H), Social Science (N) and Physical Activity/Wellness (Y, S or B) requirements. Students who have not earned an 85 or higher in a NYS foreign language Regents exam must complete one semester of a foreign language. At most 2 credits of Physical Activity/Wellness can be counted as free elective credit.

**** Must have a science sequence and one other L course, see Bulletin for details.
 (02/11)

Programming Experience

Junior Year

Fall Semester

CS 375 Design and Analysis of Algorithms
 MATH 327 Probability with Stat Methods
 CS 320 Computer Systems III: Adv. Comp. Arch.
 Social Sciences/Humanities Elective***

4 credits
 4 credits
 4 credits
4 credits
 16 credits

TOTAL

Spring Semester

CS 350 Operating Systems
 CS 373 Automata Theory & Formal Language
 Social Sciences/Humanities Elective***
 Free Elective

4 credits
 4 credits
 4 credits
4 credits
 16 credits

TOTAL

Senior Year

Fall Semester

CS 471 Programming Languages
 Computer Science Elective
 Computer Science Elective
 Free Elective

4 credits
 4 credits
 4 credits
4 credits
 16 credits

TOTAL

Spring Semester

Computer Science Elective
 Computer Science Elective
 Free Elective
 Free Elective*** (Physical Activity/Wellness)

4 credits
 4 credits
 4 credits
2 credits
 14 credits

TOTAL

**SAMPLE SCHEDULE* OF OUR FLEXIBLE FOUR YEAR PROGRAM (ENTERING IN 2012)
UNDERGRADUATE COMPUTER SCIENCE PROGRAM (with CS 110)**

Freshman Year

Fall Semester

CS 101 Topics in Computer Science 1 credit
 CS 110 Programming Concepts and Applications** 4 credits
 MATH 221 Calculus I 4 credits
 WRIT 111 Coming to Voice 4 credits
 Social Science/Humanities Elective*** 4 credits

TOTAL

17 credits

Spring Semester

CS 120 Computer Systems I: Machine Organization** 4 credits
 MATH 222 Calculus II 4 credits
 Social Sciences/Humanities Elective*** 4 credits
 Science **** 4 credits

TOTAL

16 credits

Sophomore Year

Fall Semester

CS 140 Programming with Objects** 4 credits
 Social Sciences/Humanities Elective*** 4 credits
 MATH 304 or 371 or 381 4 credits
 Science **** 4 credits

TOTAL

16 credits

Spring Semester

CS 240 Data Structures and Algorithms 4 credits
 CS 301 Ethical, Social and Global Issues in Computing 4 credits
 MATH 314 Discrete Mathematics 4 credits
 Science **** 4 credits

TOTAL

16 credits

Junior Year

Fall Semester

CS 220 Computer Systems II: Arch and Programming 4 credits
 CS 375 Design and Analysis of Algorithms 4 credits
 MATH 327 Probability with Stat Methods 4 credits
 Social Science/Humanities Elective*** 4 credits

TOTAL

16 credits

Spring Semester

CS 320 Computer Systems III: Adv. Comp. Arch. 4 credits
 CS 350 Operating Systems 4 credits
 CS 373 Automata Theory & Formal Language 4 credits
 Social Sciences/Humanities Elective*** 4 credits

TOTAL

14 credits

Senior Year

Fall Semester

CS 471 Programming Languages 4 credits
 Computer Science Elective 4 credits
 Computer Science Elective 4 credits
 Free Elective 4 credits

TOTAL

16 credits

Spring Semester

Computer Science Elective 4 credits
 Computer Science Elective 4 credits
 Free Elective 4 credits
 Free Elective*** (Physical Activity/Wellness) 2 credits

TOTAL

14 credits

Limited Programming Experience

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 ** Students without prior programming experience should take CS 110 in Fall and either CS 120 or CS 140 in the Spring—visit the CS advisor before attempting CS 120 and CS 140 together. (CS 110 counts as a free elective)
 *** These courses should be selected to fulfill the General Education Composition (C), Global Interdependencies (G), Pluralism (P), Aesthetics (A), Humanities (H), Social Science (N) and Physical Activity/Wellness (Y, S or B) requirements. Students who have not earned an 85 or higher in a NYS foreign language Regents exam must complete one semester of a foreign language. At most 2 credits of Physical Activity/Wellness can be counted as free elective credit.
 **** Must have a science sequence and one other L. course, see Bulletin for details.
 (02/11)