REQUIREMENTS FOR BACHELOR OF SCIENCE IN COMPUTER SCIENCE
for students matriculated **Fall 2019** *or after*

To receive the BS degree in computer science, the student must earn a minimum of 126 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.

Credit Requirements - A minimum of 126 semester credits of which:
- a minimum of 60 credits must be in liberal arts and sciences courses
- a minimum of 40 credits must be earned in Watson School courses

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.[1]

2. **Humanities/social science electives** ....20 credits

3. **Science**.. 12 or 14 credits[2]
   - Two course science sequence: BIOL 113, BIOL 114 and BIOL 115 or CHEM 107 and CHEM 108 or PHYS 131 and PHYS 132[3]
   - One science elective: chosen from courses that meet the General Education Laboratory Science requirement.

4. **Mathematics**[2,3] ....20 credits
   - MATH 224/225. Differential/Integral Calculus
   - MATH 226/227. Integration Tech. & Appl/Infinite Series
   - MATH 314. Discrete Math. (or MATH 330. Number Systems)
   - MATH 327. Probability with Statistical Methods (or MATH 448. Mathematical Statistics)

   - One elective chosen from:
MATH 304. Linear Algebra	MATH 381. Graph Theory	MATH 407. Intro. to the Theory of Numbers
MATH 371. Ordinary Diff. Equations	MATH 386. Combinatorics	

5. **Free electives** .... 11 or 13 credits[2]
   At least four credits must be in liberal arts and science. At most one free elective in liberal arts and science may be taken pass/fail instead of a letter grade. At most 2 credits of activity/wellness may be used as free elective credit.

6. **Computer Science (prerequisites are listed in the tables on Page 2)**[3] ....57[1] credits
   - CS 101. Professional Skills, Ethics and CS Trends
   - CS 120. Programming and Hardware Fundamentals[5]
   - CS 140. Programming with Objects and Data Structures[5]
   - CS 220. Architecture from Programmer's Perspective
   - CS 240. Data Structures and Algorithms
   - CS 320. Advanced Computer Architecture
   - CS 350. Operating Systems
   - CS 373. Automata Theory & Formal Languages
   - CS 375. Design & Analysis of Algorithms
   - CS 471. Programming Languages

   - **Four Computer Science electives chosen from A, B, C, and D below. At least one must be chosen from A and at least one from B. At most one can be taken from D. (Prerequisites are listed in the tables on Page 2):**

     A.
CS 428. Computer Networks	CS 451. Systems Programming	CS 476. Programming Models for
CS 447. High Performance Computing	CS 457. Intro. to Distributed Systems	Emerging Platforms

     B.
CS 440. Adv. Topics in OO Programming	CS 444. Programming for the Web	CS 472. Compiler Design
CS 442. Design Patterns	CS 445. Software Engineering	

     C. The following courses and CS 400-level courses approved for future catalog years
CS 402. Software and Engineering Project Management	CS 455. Introduction to Visual Info. Processing
CS 424. Microcontrollers and Robotics	CS 456. Introduction to Computer Vision
CS 426. Wireless Sensor Networks	CS 458. Introduction to Computer Security
CS 432. Database Systems	CS 459: Science of Cyber Security
CS 433. Information Retrieval	CS 460. Computer Graphics
CS 435. Introduction to Data Mining	CS 465. Introduction to Artificial Intelligence
CS 436. Introduction to Machine Learning	CS 480. Any approved CS topics course
CS 441. Game Development for Mobile Platforms	Prerequisites vary by course

     D. To count as a CS elective, must be taken for 4 credits
     CS 395. Computer Science Internship. Prerequisites: CS 220, 240, junior or senior standing and CS Department approval
     CS 396. Computer Science Co-op. Prerequisites: CS 220, 240, junior or senior standing and CS Department approval
     CS 499. Undergraduate Research. Prerequisites vary by research area. Requires junior or senior standing and CS Department approval

General Education Requirements Students must fulfill the General Education Requirements for Computer Science. Students normally complete these requirements within the 126-credit program described above.

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[1] Credits include the Communications course CS 301.

[2] The total of the science and free elective credits should be 25 credits.

[3] Pre-requisites for Mathematics and Science courses appear in the University Bulletin entries for the Mathematics and Science programs.

[4] CS pre-requisites must have a grade of at least C-. See the University Bulletin for any additional grade restrictions all other courses.

[5] CS 110 is a prerequisite. CS Majors may request a waiver from the Undergraduate Director based on prior programming experience.

Supplemental information regarding the BSCS Degree Requirements

The following information supplements that provided in the University Bulletin. It applies to students who matriculated Fall 2016 or after.

All required Computer Science courses, except CS 101, are offered every semester. The minimum grade in a required Computer Science course must be at least a C- to be allowed to take any Computer Science course, for which it is a prerequisite.

Calculus Topics are broken down as follows:
- MATH 224. Differential Calculus
- MATH 225. Integral Calculus
- MATH 226. Integration Techniques and Applications
- MATH 227. Infinite Series

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. The following Binghamton University course can be substituted for MATH 327: MATH 448 (Introduction to Probability and Statistics II), which has a prerequisite of MATH 323 and MATH 447.

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 HWS 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.

Prerequisites for Computer Science Courses

The MATH and CS pre-requisites must have a grade of at least C-.

Course	Prerequisites
CS 101	None
CS 110	MATH 225[1]
CS 120	CS 110, MATH 225[1]
CS 140	CS 110, MATH 225
CS 220	CS 120, 140
CS 240	CS 120, 140, MATH 226[1]
CS 301	CS 101, Gen Ed C course, CS 220/CS 240[2]
CS 320	CS 220
CS 350	CS 220, 240, 301[1]
CS 373	CS 140, MATH 314/330[2,3]
CS 375	CS 240, MATH 227, 314/330[2,3], CS 301[1]
CS 402	CS 220, 240
CS 424	CS 350[1]
CS 426	CS 350
CS 428	CS 350
CS 432	CS 375
CS 433	CS 375
CS 435	CS 375, MATH 304, 327/448[2,3]

Course	Prerequisites
CS 436	CS 375, MATH 327/448[2,3]
CS 440	CS 240, 350
CS 441	CS 140, 375
CS 442	CS 140, 375
CS 443	CS 320, 350
CS 444	CS 320/CS 350/CS 375[2]
CS 445	CS 350/375
CS 447	CS 220, CS 240, (CS 320/CS350[2])
CS 451	CS 350
CS 455	CS 375
CS 456	CS 375
CS 457	CS 350
CS 458	CS 350, 375
CS 459	CS 375, MATH 327/448[2,3]
CS 460	CS 375
CS 465	CS 375
CS 471	CS 373, 375
CS 472	CS 373, 375
CS 476	CS 140, 320, 350

[1] Can be taken concurrently with the course in the left column
[2] The notation Course1/Course2 indicates that these courses are alternatives: take either Course1 or Course2.
[3] Prerequisites for MATH courses are found in the University Bulletin for the Mathematics Programs.