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
   - MATH 221. Calculus I
   - MATH 222. Calculus II
   - MATH 314. Discrete Mathematics (or MATH 330)
   - MATH 327. Probability with Statistical Methods
   - One elective chosen from:
     MATH 304. Linear Algebra
     MATH 356. Mathematical Modeling
     MATH 371. Ordinary Differential Equations
     MATH 381. Graph Theory
     MATH 407. Introduction to the Theory of Numbers
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** ..... 57[1] credits
   - CS 101. Introductory Topics in Computer Science
   - CS 120. Computer Systems I: Machine Organization[2]
   - CS 140. Programming with Objects[2]
   - CS 220. Computer Systems II: Arch. and Prog.
   - CS 240. Data Structures and Algorithms
   - 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
   - **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
     CS 442. Design Patterns
     CS 460. Computer Graphics
     CS 472. Compiler Design

     Programming Languages
     CS 328. Internet Programming
     CS 422. Web-Based Programming
     CS 424. Microcontrollers and Robotics
     CS 440. Adv. Topics in OO Programming
     CS 442. Design Patterns
     CS 472. Compiler Design
     CS 476. Programming Models for Emerging Platforms

     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
     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

     Database and Information Systems
     CS 338. Introduction to Multimedia Systems
     CS 432. Database Systems
     CS 433. Information Retrieval
     CS 435. Introduction to Data Mining
     CS 436. Intro to Machine Learning
     CS 448. Multimedia Systems
     CS 455. Introduction to Visual Information Processing
   - **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
     CS 498. Undergraduate Project
     CS 499. Undergraduate Research

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.

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