REQUIREMENTS FOR BACHELOR OF SCIENCE IN COMPUTER SCIENCE

for students matriculated **Fall 2014** *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.

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

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
   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** ..... 57[1] credits
   - CS 101. Professional Skills, Ethics and CS Trends
   - 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 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.:**

     A.
     CS 428. Computer Networks
     CS 451. Systems Programming
     CS 457. Introduction to Distributed Systems
     CS 476. Programming Models for Emerging Platforms

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

     C.
     CS 328. Internet Programming
     CS 338. Introduction to Multimedia Systems
     CS 346. Enterprise Systems
     CS 360. GUI and Windows Programming
     CS 402. SW & Engineering Project Mgmt
     CS 422. Web-Based Programming
     CS 423. Design and Impl. of Embedded Systems
     CS 424. Microcontrollers and Robotics
     CS 426. Wireless Sensor Networks
     CS 432. Database Systems
     CS 431. Enterprise Network Security
     CS 433. Information Retrieval
     CS 435. Introduction to Data Mining
     CS 436. Intro to Machine Learning
     CS 446. Enterprise Systems Management
     CS 448. Multimedia Systems
     CS 455. Introduction to Visual Information Processing
     CS 458. Introduction to Computer Security
     CS 460. Computer Graphics
     CS 480Z. z/VM Virtualization

     D. To count as a CS elective, must be taken for 4 credits
     CS 395. Computer Science Internship
     CS 396. Computer Science Co-op
     CS 498. Undergraduate Project
     CS 499. Undergraduate Research

General Education Requirements Students must fulfill the General Education Requirements for Computer Science. Students normally complete these requirements within the 127-credit program described above.

[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 2014 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.

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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SAMPLE SCHEDULE* OF OUR FLEXIBLE FOUR YEAR PROGRAM (ENTERING IN 2014)
UNDERGRADUATE COMPUTER SCIENCE PROGRAM

Freshman Year

Fall Semester

CS 101 Professional Skills, Ethics and CS Trends	1 credit
CS 120 Computer Systems I: Machine Organization **	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 140 Programming with Objects **	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 220 Computer Systems II: Arch and Programming	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 375 Design and Analysis of Algorithms	4 credits
MATH 327 Probability with Stat Methods	4 credits
CS 320 Computer Systems III: Adv. Comp. Arch.	4 credits
Social Sciences/Humanities Elective***	4 credits
TOTAL	16 credits

Spring Semester

CS 350 Operating Systems	4 credits
CS 373 Automata Theory & Formal Language	4 credits
Social Sciences/Humanities Elective***	4 credits
Free Elective	4 credits
TOTAL	16 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

Programming Experience

* 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 Gened 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. One Free Elective must be in Liberal Arts & Science. 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.

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SAMPLE SCHEDULE* OF OUR FLEXIBLE FOUR YEAR PROGRAM (ENTERING IN 2014)
UNDERGRADUATE COMPUTER SCIENCE PROGRAM (with CS 110)

Freshman Year

Fall Semester

CS 101 Professional Skills, Ethics and CS Trends	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 220 Computer Systems II: Arch and Programming	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 240 Data Structures and Algorithms	4 credits
CS 373 Automata Theory & Formal Language	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 375 Design and Analysis of Algorithms	4 credits
Social Sciences/Humanities Elective***	4 credits
TOTAL	16 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

* 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 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. One Free Elective must be in Liberal Arts & Science. 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.

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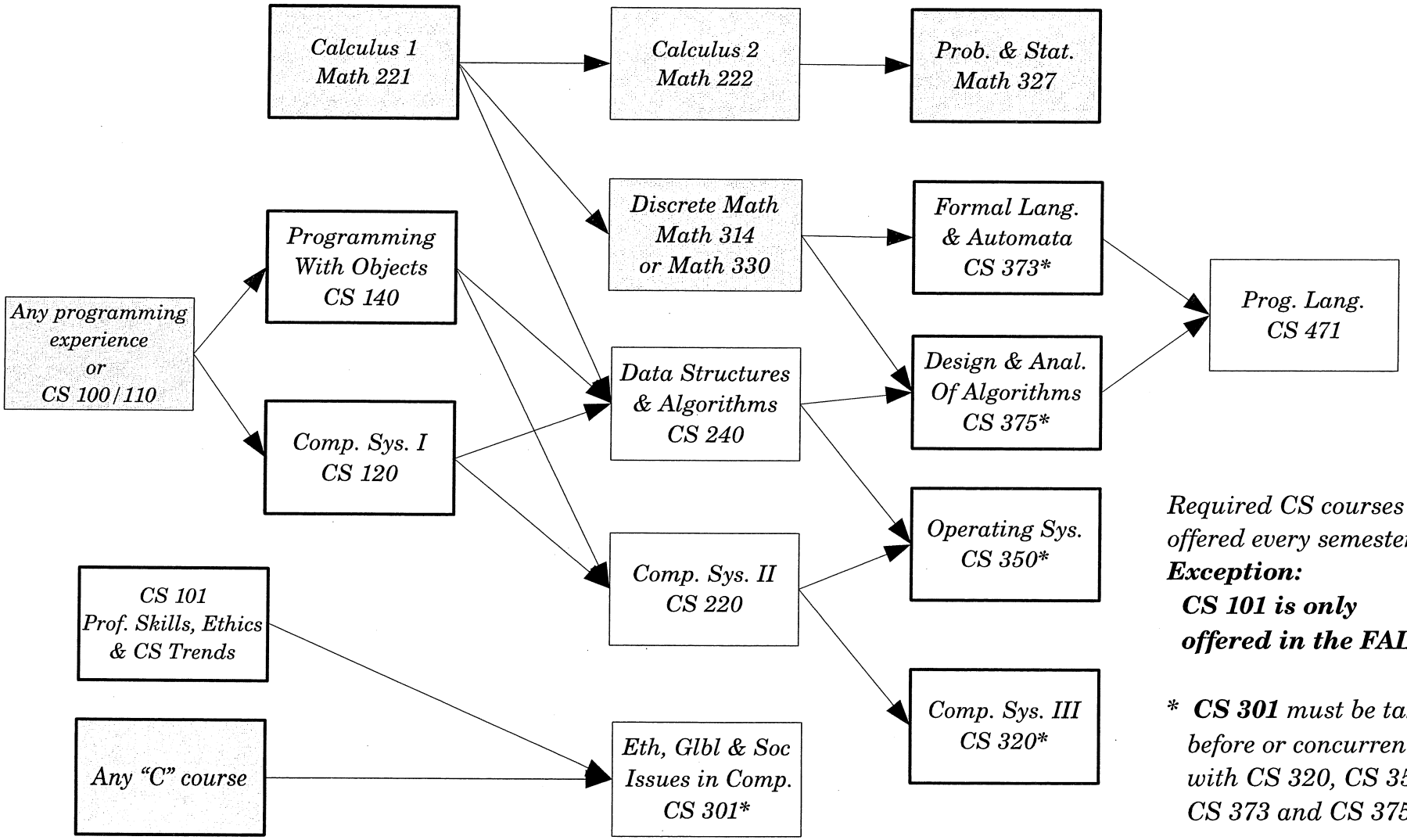
Dependency Flow Chart for CS Required Courses
Fall 2014



Required CS courses offered every semester
Exception:
CS 101 is only offered in the FALL

* ***CS 301*** *must be taken before or concurrently with CS 320, CS 350, CS 373 and CS 375*

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