This document describes the requirements for an undergraduate major in Computer Science. It applies to students entering in the Fall 2013 term and thereafter.

Disclaimer: The Syracuse University Bulletin: Undergraduate Course Catalog has the official description of the program. This document is intended to contain a restatement and an elaboration on what is in the catalog. However, if on some point this document and the catalog are in conflict, the catalog always wins.
§1. Summary

The current Computer Science (CS) undergraduate curriculum was approved by the faculty of the department of Electrical Engineering and Computer Science in the Spring of 2011.

The requirements for the program of study are divided into three categories: general education, mathematics and major. The general education category has requirements in writing, presentation skills, natural science and engineering, and a requirement for courses offered by the College of Arts and Sciences or the College of Visual and Performing Arts. The major category has two parts—the computer science core, and the upper-division electives.

<table>
<thead>
<tr>
<th>General Education</th>
<th>Mathematics</th>
<th>Major</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 Writing (WRT 105, WRT 205)</td>
<td>15 or 16 Mathematics</td>
<td>33 Computer and Information Science core courses</td>
</tr>
<tr>
<td>3 Presentation Skills</td>
<td></td>
<td>18 upper-division courses</td>
</tr>
<tr>
<td>18 Natural Science and Engineering (including ECS 101, 102 and PHY 211, 221)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21 Arts, Humanities, and Social Sciences (including PHI 251, ECS 392)</td>
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</tr>
<tr>
<td>9 free electives</td>
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<tr>
<td></td>
<td></td>
<td>123 or 124 Credit hours total</td>
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</tbody>
</table>

Table 1: Credit hours required for the CS Bachelor’s program.

§2. Important Notes on Course Restrictions

The restrictions on courses listed below are not comprehensive. Students unclear about the appropriateness of courses for meeting a distribution requirement must petition for acceptance of the course(s) through the CIS program committee before taking the course.

Prior to registration each semester, students must meet with their faculty advisors for assistance in choosing appropriate courses.

§3. General-Education Requirements

The intent of the general-education requirements is to ensure that students graduate with knowledge of subjects beyond Computer Science, with particular emphasis on writing skills.

§3.1. Writing Requirements

The following two courses are required:

WRT 105 Writing Studio 1
WRT 205 Writing Studio 2
§3.2. **Presentation Skills Requirement**

Students must successfully complete at least one of the following courses:

- CRS 255 *Public Advocacy*
- CAS 325/CRS 325 *Presentational Speaking*
- IST 444 *Information Reporting and Presentation*

§3.3. **Natural Science and Engineering Requirements**

Eighteen credits of natural science and engineering courses are required: six in engineering and twelve in science. These engineering courses are required:

- ECS 101 *Introduction to Engineering and Computer Science*
- ECS 102 *Introduction to Computing*

The twelve credits of science must include a two-semester sequence in a laboratory science, as well as the following courses:

- PHY 211 *General Physics*
- PHY 221 *General Physics Lab*

A student may take the second physics course (PHY 212) and its associated lab (PHY 222) to satisfy the two-semester requirement; the student would still have to take an additional four credits of science. Possible two-course sequences include the following:

- PHY 211/221 *(General Physics I and Laboratory)*
  - and
- PHY 212/222 *(General Physics II and Laboratory)*

- CHE 106/107 *(General Chemistry Lecture and Laboratory)*
  - and
- CHE 116/117 *(General Chemistry Lecture II and Laboratory)*

- BIO 121 *(General Biology)*
  - and
- BIO 123/124 *(General Biology II and General Biology II Laboratory)*

Additional courses that may be used to complete the science requirement include those in the following departments, except those courses specifically excluded or whose content relates primarily to computing and/or mathematics, or to social and historical issues. Such courses may be appropriate for other distribution requirements.

- Anthropology, Physical (ANT 131, 331, 431, 432, 433)
- Chemistry (CHE)
- Materials Science (MTS)
- Biology (BIO)
- Earth Sciences (EAR)
- Physics (PHY)

The following courses **do not** satisfy the science requirement:
## §3.4. Arts, Humanities, and Social Sciences Requirements

Students are required to take PHI 251 (*Logic*), ECS 392 (*Ethical Aspects of Engineering and Computer Science*), and fifteen additional credit hours of courses in fine arts, humanities, and/or social sciences. These courses (A/H/SS) are to be drawn from the offerings of the College of Arts and Sciences and the College of Visual and Performing Arts. Courses from the following departments may be used:

- Art Photography (APH)
- African American Studies (AAS)
- Applied Music (AMC)
- American Studies (AMS)
- Anthropology–Social and Cultural (ANT)
- Art (ART)
- Ceramics (CER)
- Chinese (CHI)
- Communications Design (CMD)
- Communication and Rhetorical Studies (CRS)
- Drama (DRA)
- Economics (ECN)
- English and Textual Studies (ETS)
- Fine Arts (FIA)
- Fiber Arts (FIB)
- Film (FIL)
- Foundation (FND)
- French (FRE)
- Fashion Illustration (FSH)
- Geography (GEO)
- German (GER)
- Greek (GRE)
- Hebrew (HEB)
- Hindi (HIN)
- History (HIS)
- Humanities (HUM)
- Illustration (ILL)
- International Relations (IRP)
- Interior Design (ISD)
- Italian (ITA)
- Latin (LAT)
- Linguistics (LIN)
- Literature in Translation (LIT)
- Metalsmithing (MET)
- Music History & Literature (MHL)
- Museum Studies (MUS)
- Public Affairs & Citizenship (PAF)
- Philosophy (PHI)
- Polish (POL)
- Political Science (PSC)
- Psychology (PSY)
- Printmaking (PRT)
- Painting (PTG)
- Lesbian, Gay, Bisexual and Transgender Studies (QSX)
- Religion (REL)
- Russian (RUS)
- Sculpture (SCU)
- Sociology (SOC)
- Social Science (SOS)
- Spanish (SPA)
- Surface Pattern Design (SPD)
- Studio Arts (STA)
- Art Video (VID)
- Writing (WRT)
- Women’s and Gender Studies (WGS)

The following courses/departments **cannot** be used:
Art Education (AED)  Earth Sciences (EAR)
Astronomy (AST)   Industrial Design (IND)
Advertising Design (ADD)  Mathematics (MAT)
Anthropology–Physical (see above)  Music Education (MUE)
Biology (BIO)  Nondepartmental AS (NAS)
Chemistry (CHE)  Physics (PHY)
Cognitive Science (COG)  Science Teaching (SCI)
Communication Sciences & Disorders (CSD)  Undergraduate Research Program (URP)
Computer Graphics (CGR)  WRT 105, WRT 205

Also excluded are any courses cross-listed in the College of Arts and Sciences and the School of Education, as well as the following courses:

ANT 131, 431, 433  HNR 250, 255, 350, 355, 450, 455
CFS courses  PSY 223, 252, 323, 324, 334
GEO 155, 215, 316, 326, 482

§ 3.5. Free Electives

Any and all courses may be taken as free electives, with the following exception:

CPS courses do not count as free-elective credits for CS majors.

§ 4. Mathematics Requirements

Fifteen or sixteen credit hours of Mathematics courses are required. No grade below C− is acceptable.

Students must take both:

MAT 295  Calculus I
MAT 296  Calculus II

Students must also take at least one of:

MAT 397  Calculus III
MAT 331  Linear Algebra

Students must also take:

CIS 321  Introduction to Probability and Statistics

MAT 295, 296, and 397 are four-credit courses, as is CIS 321. MAT 331 is a three-credit course.

§ 5. Course Requirements for the Major

No grade below C− is acceptable for a course in the major category.
5.1. CIS Core Course Requirements

The following ten courses (33 credit hours) are required. These courses must be completed with a core GPA of at least 2.667. No grade below C– is acceptable for a course in the major category.

CIS 252 Introduction to Computer Science
CIS 275 Introduction to Abstract Mathematics
CIS 341 Computer Organization and Programming Systems
CIS 342 Introduction to Systems Programming
CIS 351 Data Structures
CIS 352 Programming Languages: Theory and Practice
CIS 453 Software Specification and Design
CIS 454 Software Implementation
CIS 473 Computability Theory
CIS 477 Introduction to Analysis of Algorithms
CIS 486 Design of Operating Systems

The diagram on the right shows the prerequisite structure of the core courses. Note that a few of these prerequisites have some flexibility (e.g., CIS 252 and MAT 295 can be taken concurrently). As always, check with the course catalog and the course instructor for details.

5.2. Upper-Division Course Restrictions

Eighteen credit hours of upper-division courses are required. At least 9 of the 18 credits must be computer science or computer engineering courses.

Upper-division courses include the following:

CIS 400 Selected Topics  CSE 397 Computer Laboratory I
CIS 425 Intro to Computer Graphics  CSE 398 Computer Laboratory II
CIS 428 Intro to Cryptography  CSE 483 Windows Programming
CIS 458 Data Networks: Basic Principles  CSE 561 Digital Machine Design
CIS 467 Intro to Artificial Intelligence  CSE 581 Intro to Database Management Systems
CIS 468 Natural Language Processing  PHI 378 Minds and Machines
CIS 471 Optimization Methods  PHI 551 Symbolic Logic
CIS 478 Intro to Quantum Computing  PHI 552 Modal Logic
CIS 483 Intro to Computer and Network Security  CSE 543/ELE 516 Control of Robots
CIS 531 Compiler Construction  CIS 553 Software Systems Implementation
CIS/MAT 545 Finite Mathematics  CIS 554 Object Oriented Programming in C++
CIS 565 Intro to Artificial Neural Networks  CIS 567 Knowledge Representation and Reasoning
CIS 583 Systems Assurance Seminar

Students may choose any other CIS course numbered above 300, except those that carry no credit hours. Courses that do not qualify as upper-division electives include:

CIS 470 Experience Credit
CIS 490 Independent Study
CS students may also choose any MAT courses numbered above 400, except for the following:

**MAT 485  Differential Equations and Matrix Algebra for Engineers**

**NOTE:** MAT 521 (*Intro to Probability*) cannot be counted towards the CIS 321 requirement, but can be counted as an upper-division elective.

CS students may also choose topics courses (e.g., PHI 460 *Logic and Foundations of Mathematics*); however, they must petition the CIS program committee to have the specific course accepted *before* taking the course.

## 6. Representative CIS Undergraduate Programs

Here is a fairly typical CIS undergraduate program for a student who initially places into MAT 295.

<table>
<thead>
<tr>
<th>Fall</th>
<th>Spring</th>
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</thead>
<tbody>
<tr>
<td><strong>First Year</strong></td>
<td></td>
</tr>
<tr>
<td>ECS 101</td>
<td>CIS 252</td>
</tr>
<tr>
<td>ECS 102</td>
<td>MAT 296</td>
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<tr>
<td>MAT 295</td>
<td>PHY 211, PHY 221</td>
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<tr>
<td>WRT 105</td>
<td>PHI 251</td>
</tr>
<tr>
<td>A/H/SS elective*</td>
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<tr>
<td><strong>Second Year</strong></td>
<td></td>
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<tr>
<td>CIS 275</td>
<td>CIS 321</td>
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<tr>
<td>CIS 351</td>
<td>CIS 341, CIS342</td>
</tr>
<tr>
<td>MAT 397 or MAT 331</td>
<td>CIS352</td>
</tr>
<tr>
<td>A/H/SS elective</td>
<td>WRT 205</td>
</tr>
<tr>
<td></td>
<td>free elective</td>
</tr>
<tr>
<td><strong>Third Year</strong></td>
<td></td>
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<tr>
<td>CIS 453</td>
<td>CIS 454</td>
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<tr>
<td>CIS 477</td>
<td>CIS 473</td>
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<tr>
<td>CIS 486</td>
<td>upper-division course</td>
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<tr>
<td>presentation-skills elective</td>
<td>A/H/SS elective</td>
</tr>
<tr>
<td>science elective</td>
<td>science elective</td>
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<tr>
<td><strong>Fourth Year</strong></td>
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<tr>
<td>upper-division course</td>
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<td>upper-division course</td>
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<tr>
<td>upper-division course</td>
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<tr>
<td>ECS 392</td>
<td>free elective</td>
</tr>
<tr>
<td>A/H/SS elective</td>
<td>free elective</td>
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</tbody>
</table>

*Students wishing to preserve the option of transferring to an engineering major at the end of the first semester should take CHE 106/107 in place of the A/H/SS elective.*
Here is a fairly typical CIS undergraduate program for a student who initially places into MAT 194.

<table>
<thead>
<tr>
<th></th>
<th>Fall</th>
<th>Spring</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>First Year</strong></td>
<td>ECS 101</td>
<td>CIS 252</td>
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<td></td>
<td>ECS 102</td>
<td>MAT 295</td>
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<td>MAT 194</td>
<td>PHY 211, PHY 221</td>
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<td>WRT 105</td>
<td>PHI 251</td>
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<td></td>
<td>A/H/SS elective*</td>
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<tr>
<td><strong>Second Year</strong></td>
<td>CIS 275</td>
<td>CIS 321</td>
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<td>CIS 351</td>
<td>CIS 341 CIS 342</td>
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<td>MAT 296</td>
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<td></td>
<td>A/H/SS elective</td>
<td>MAT 397 or MAT 331</td>
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<td>free elective</td>
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<tr>
<td><strong>Third Year</strong></td>
<td>CIS 453</td>
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<td>CIS486</td>
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<td></td>
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<tr>
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<tr>
<td></td>
<td>ECS 392</td>
<td>A/H/SS elective</td>
</tr>
<tr>
<td></td>
<td>A/H/SS elective</td>
<td>free elective</td>
</tr>
</tbody>
</table>

*Students wishing to preserve the option of transferring to an engineering major at the end of the first semester should take CHE 106/107 in place of the A/H/SS elective.