The Undergraduate Student Handbook

EECS Program in
Computer and Information Science

August 2013

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.

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

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)	Biology (BIO)
Chemistry (CHE)	Earth Sciences (EAR)
Materials Science (MTS)	Physics (PHY)

The following courses **do not** satisfy the science requirement:

Social, Cultural Anthropology (ANT)
BIO 211
CHE 103, 113
EAR 102, 105
PHY 101/111, 102/112, 105, 106
Astronomy (AST)
BIO 215
Geography (GEO)
NEU 211

§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)
Astronomy (AST)
Advertising Design (ADD)
Anthropology–Physical (see above)
Biology (BIO)
Chemistry (CHE)
Cognitive Science (COG)
Communication Sciences & Disorders (CSD)
Computer Graphics (CGR)
Earth Sciences (EAR)
Industrial Design (IND)
Mathematics (MAT)
Music Education (MUE)
Nondepartmental AS (NAS)
Physics (PHY)
Science Teaching (SCI)
Undergraduate Research Program (URP)
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
CFS courses
GEO 155, 215, 316, 326, 482
HNR 250, 255, 350, 355, 450, 455
PSY 223, 252, 323, 324, 334

§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.

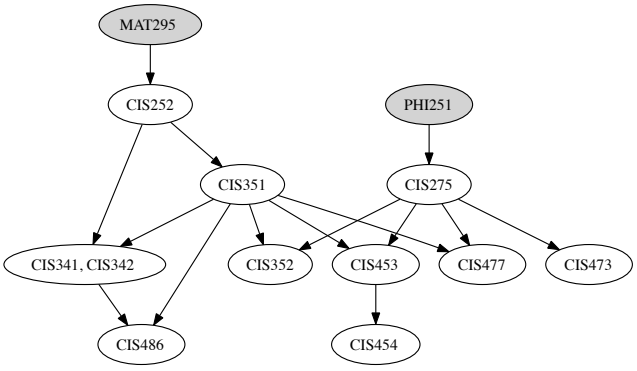
§5. Course Requirements for the Major

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*
CIS 425 *Intro to Computer Graphics*
CIS 428 *Intro to Cryptography*
CIS 458 *Data Networks: Basic Principles*
CIS 467 *Intro to Artificial Intelligence*
CIS 468 *Natural Language Processing*
CIS 471 *Optimization Methods*
CIS 478 *Intro to Quantum Computing*
CIS 483 *Intro to Computer and Network Security*
CIS 531 *Compiler Construction*
CIS/MAT 545 *Finite Mathematics*
CIS 543/ELE 516 *Control of Robots*
CIS 553 *Software Systems Implementation*
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*

CSE 397 *Computer Laboratory I*
CSE 398 *Computer Laboratory II*
CSE 483 *Windows Programming*
CSE 561 *Digital Machine Design*
CSE 581 *Intro to Database Management Systems*

PHI 378 *Minds and Machines*
PHI 551 *Symbolic Logic*
PHI 552 *Modal Logic*

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.

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

*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.

	Fall	Spring
First Year	ECS 101 ECS 102 MAT 194 WRT 105 A/H/SS elective*	CIS 252 MAT 295 PHY 211, PHY 221 PHI 251
Second Year	CIS 275 CIS 351 MAT 296 A/H/SS elective	CIS 321 CIS 341 CIS 342 WRT 205 MAT 397 or MAT 331 free elective
Third Year	CIS 453 CIS 477 CIS486 presentation-skills elective science elective	CIS 454 CIS 473 CIS 352 A/H/SS elective science elective
Fourth Year	upper-division course upper-division course upper-division course ECS 392 A/H/SS elective	upper-division course upper-division course upper-division course A/H/SS elective free elective

*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.