

College of Engineering
Department of Computer Science
Bachelor of Science Degree in Computer Science
For students graduating in calendar year 2011

Fall		Spring	
<u>Freshman Year</u>			
Chem 1035 General Chemistry ³	(3)___	CS 1705 Intro to Object-Oriented Develop I <u>or</u>	(3)___
Chem 1045 General Chem Lab ³	(1)___	CS 1124 Intro to Media Computation	
EngE 1024 Engineering Exploration ⁸	(2)___	EngE 1104 Exploration of the Digital Future ⁸	(2)___
Math 1114 Elementary Linear Algebra	(2)___	Math 1224 Vector Geometry	(2)___
Math 1205 Calculus I	(3)___	Math 1206 Calculus II	(3)___
Engl 1105 Freshman English ^{1, 4, 8}	(3)___	Phys 2305 Foundations of Physics I ³	(4)___
CLE Elective ^{1, 4}	(3)___	Engl 1106 Freshman English ^{1, 4, 8}	(3)___
Total	17	Total	17
<u>Sophomore Year</u>			
CS 2104 Intro to Problem Solving in CS	(3)___	CS 2114 Software Design & Data Structures	(3)___
Math 2224 Multivariable Calculus	(3)___	CS 2505 Intro to Computer Organization I	(3)___
Math 2534 Discrete Math and Logic ²	(3)___	Math 2214 Intro to Differential Equations	(3)___
Natural Science Elective ³	(3)___	CLE Elective ^{1, 4}	(3)___
Natural Science Lab ³	(1)___	CLE Elective ^{1, 4}	(3)___
CLE Elective ^{1, 4}	(3)___		
Total	16	Total	15
<u>Junior Year</u>			
CS 3114 Data Structures and Algorithms	(3)___	CS 3304 Programming Languages	(3)___
CS 2506 Intro to Computer Organization II	(3)___	CS 3204 Operating Systems	(3)___
CS3/4XXX Elective ⁶	(3)___	CS 3604 Professionalism ⁸	(3)___
Comm 2004 Public Speaking ^{4, 8}	(3)___	Stat 4705 Statistics for Engineers <u>or</u>	(3)___
Math 3134 Combinatorics ²	(3)___	Stat 4714 Probability & Statistics for EE	
		Free Elective	(3)___
Total	15	Total	15
<u>Senior Year</u>			
CS 41X4 Theory Course ⁵	(3)___	CS 4944 Senior Seminar ⁸	(1)___
CS 3/4XXX Elective ⁶	(3)___	CS 4XXX Capstone ^{8, 9}	(3)___
CS Technical Elective ⁷	(3)___	CS 4XXX Elective ⁶	(3)___
Engl 3764 Technical Writing ^{4, 8}	(3)___	CLE Elective ^{1, 4}	(3)___
CLE Elective ^{1, 4}	(3)___	Free Elective	(3)___
Total	15	Total	13

Footnotes:

1. **Curriculum for Liberal Education Requirements (CLE).** (Consult *Guide for Curriculum for Liberal Education* at <http://www.uaac.vt.edu/coreguides/index.html> for list of allowable courses for Areas 2, 3, 6 & 7.)

Area 1: Writing and Discourse. 6 credits of freshman English.

_____ Engl 1105 (3 cr) _____ Engl 1106 (3 cr)

Area 2: Ideas, Cultural Traditions, and Values, 6 credits

_____ (3 cr) _____ (3 cr)

Area 3: Society and Human Behavior, 6 credits

_____ (3 cr) _____ (3 cr)

Area 4: Scientific Reasoning and Discovery is met by courses required for the major.

Area 5: Quantitative and Symbolic Reasoning is met by courses required for the major.

Area 6: Creativity and Aesthetic Experience, 1 credit. While CS majors can meet Area 6 with a one-credit course, taking a three-credit course for this area may help meet the 30-hour non-technical elective requirement discussed in footnote 4.

_____ (1 or 3 cr)

Area 7: Critical Issues in a Global Context, 3 credits

_____ (3 cr)

2. **CS/Math double majors** take the pair of courses Math 3034, Math 3124 in place of Math 2534, Math 3134.
3. **Natural Science Elective/Lab**. Computer Science majors must have a minimum of 12 hours of natural science. Of those 12 hours, 8 hours must be in a sequence. This requirement can be satisfied by taking the required Chem 1035/45 and Phys 2305, and then one of (Chem 1036/46) or Phys 2306. (Chem 1036/46 may not be offered every fall semester.)

Students can also satisfy the sequence requirement by completing an eight hour sequence in Biology in addition to Chem 1035/45 and Phys 2305: to do so, students must complete one of the following sequences: (Bio 1005-6 & 1015-6), or (Bio 1105-6 & 1115-6), or (Bio 1105-6 & 1125-6).

4. **Computer Science Non-technical Course Requirement**. CS majors must complete 30 credits of non-technical courses.

All courses are approved as non-technical courses except those in the sciences (Biology, Chemistry, Geosciences, Physics), the College of Engineering (all departments including Computer Science), and the mathematical sciences (Mathematics, Statistics). Also excluded are courses listed as technical electives in footnote 7; a course cannot be both a technical elective and non-technical course.

5. **Computer Science Theory Course**. All CS majors must take one of the CS senior-level theory courses: 4104, 4114, 4124.
6. **Computer Science 3000/4000 Elective**. Students can select any 3-credit CS 3000 or 4000-level course, excluding 4004 and 4014 but including CS Independent Study (4974) and CS Undergraduate Research (4994), not used to satisfy another requirement.
7. **Computer Science Technical Elective**.
 - a. Any 3-credit CS 3/4/5000-level course (except 4004 and 4014) not otherwise used to fulfill a Computer Science requirement can be used as a technical elective, including both Independent Study (CS 4974) and Undergraduate Research (CS 4994).
 - b. An approved 4000-level course in another discipline that has significant technical content relevant to the science or application of computer technology can be used as a technical elective.
 - i. Requests to have a non-CS course approved as a technical elective are made by submitting, prior to taking the course, the request for substitution form available in the CS Advising Center. This includes non-CS Independent Study (4974) and Undergraduate Research (4994) courses.
 - ii. Below is a listing of non-CS courses that are approved as technical electives. **Note:** Many of these courses are restricted to majors other than CS in certain semesters, and virtually all have prerequisites that must be met to be eligible to take the course.

ACIS 4515, 4524	COMM 4374	GEOG/GEOS 4084
ACIS/BIT 4554, 4564	ECE 3504, 3534, 4510, 4524, 4550, 4560, 4564	GEOG 4314, 4324
BIT 4434, 4444, 4494, 4514	ECE 4984 (depending on topic)	MATH 4175

8. **Visual Expression, Written and Spoken (ViEWS) Requirement**. (ViEWS requirements are applicable to all students entering Fall 2005 and thereafter.) Courses used to satisfy the CS ViEWS requirement: Engl 1105, Engl 1106, EngE 1024, EngE 1104, Engl 3764, Comm 2004, CS 3604, CS 4944 and the CS capstone course.
9. **Capstone Requirement**. CS Majors must complete one senior capstone course. Students can choose from CS 4624, CS 4414, CS 4644, CS 4704, and other CS 4000 level courses approved as meeting the capstone requirement.

Additional Requirements and Notes:

- A. **Grade of "C" or Better Required in Specific CS Courses:** To qualify for a B.S. degree in Computer Science, a student must earn a "C" (2.0) or better in (CS 1705 or CS 1124), CS 2104, CS 2114, CS 2505, CS 2506 and CS 3114.
- B. **Prerequisites:** There are no hidden prerequisites for required courses on this checksheet. Students should always refer to the latest version of the Undergraduate Course Catalog for the most up-to-date listing of prerequisites. To ensure timely completion of requirements, please see a Computer Science academic advisor before scheduling classes each semester.

- C. Progress Towards Degree (Policy 91):** A Computer Science major must do the following in order to maintain satisfactory progress towards the degree:
1. be registered in at least one 3-credit course required in the major during each on-campus semester of the regular academic year;
 2. maintain a GPA of 2.0 or better in the major;
 3. maintain an overall GPA of 2.3 or better;
 4. not take any CS course required in the major more than twice, including attempts ending in course withdrawal; and
 5. not repeat more than 3 CS courses required in the major, including attempts ending in course withdrawal.
- D. Non-Degree Courses.** Please be aware that not all courses that you have taken at Virginia Tech will count toward an undergraduate engineering degree. Such courses may not be used to satisfy any graduation requirement, including free electives. Listed below are courses which do not count toward an undergraduate engineering degree. You should also check with your engineering department about additional departmental non-credit courses. This list is updated periodically. Be sure to review the list each semester at the College of Engineering's Academic Affairs homepage.
- CS majors may not take the following courses for degree credit:**
- ATSC or COS 2984 (Athletic Transitions, Exploring Careers)
 CS 1004 (Computer Literacy). (no credit awarded to CS majors for these courses: CS 4004, 4014)
 CEE 4984 (Review of CE Fundamentals of FE Exam)
 UNIV 1004, 1014, 1704, 2004, 2984, 4984 (College Success Strategies, Cadet Success Strategies)
 EDCI 4974 Mentoring
 EDHL 2984 (First Year Seminar, International Bridge Program, Resident Education, Resident Life, Leadership from International Prospective, Healthy Living, Transition I, II)
 EDHL 4964 (Field Study)
 EDHL 4974 (Wing Student Teaching Assistant)
 EDHL 4984 (Orientation Skills, Orientation/Peers, Orientation/Leader)
 EF/ENGE 2984 (Engineering Success Seminar)
 ENGL 1004, 0014 (English as a Second Language)
 ENGR 2984 (C Aspire Seminar, College Success Strategies for Engineers, Engineering Success Strategies, Women in Engineering, Hypatia Seminar, Second Year Hypatia Seminar, Engineering Honors Seminar, Freshman Engineering Seminar, Undergraduate Research Seminar, Mentoring Seminar)
 ENGR 1014 (Engr Research Seminar)
 ENGR 1034 (First Year Hypatia Seminar)
 ENGR 1054 (First Year Galileo Seminar)
 ENGR 2044 (Second Year Hypatia Seminar)
 ENGR 3004 (Mentoring Seminar)
 ENGR 4984 (CEED Team Leader Seminar)
 ESM 2984 (ESP Statics)
 ESM 4404 (Fundamentals of Professional Engineering)
 FCD 2984 (Success Project)
 HD 2984 (Healthy Living, Success Project)
 MASC 1024 (Mathematics, A Liberal Arts Approach), 1034 (Statistics, a Liberal Arts Approach), 1044 (Computer Science, A Liberal Arts Approach)
 Math 1504 (PreCalc), 2984 (Emerging Scholar), 1015 (Elem Cal with Trig. CS Majors may receive 1015 credit if taken before 1205), 1016 (Elem Calc with Trig), 1525-1526 (Elem Calc with Matrices), 2015-2016 (Elem Calc with Trig II)
 ME 4984 (SAE Automotive Essentials)
 PHYS 2205-2206 (General Physics, not Calc-based)
 PSYC 2984 (First Year Experience, Athletic Transitions)
 UNIV 2394 (Introduction to Residence Life)
- E. Total Hours and Minimum GPA Requirements:** Each student must complete at least 123 semester credit hours with a minimum overall GPA of 2.00 and a minimum in-major GPA of 2.00. The in-major GPA is calculated using all classes with a CS designator except CS 1004, 4004, and 4014.
- F. Applicable Checksheet and Curriculum for Liberal Education Requirements:** Graduation requirements are determined by the checksheet in effect at the time of graduation (except for University CLE requirements as discussed below). Each checksheet is applicable for an entire calendar year, i.e., the May, Summer, and December completion dates of that year.
- Curriculum for Liberal Education requirements are based upon the date of entry to Virginia Tech, which is assumed to be Fall Semester, four years prior to the date of graduation. Students whose date of entry into Virginia Tech differs from that assumed by the checksheet must determine which University CLE Requirements apply to them. Students with questions about this matter should refer to the University CLE guides at <http://www.uaac.vt.edu/coreguides/index.html> and consult with their advisor.
- G. Foreign Language Requirement:** Any student who did not complete two years of one foreign language in high school must earn six credits in one language in college-level courses. These credits do not count toward minimum graduation requirements.
- H. CS Independent Study/Undergraduate Research Credits: Maximum credits, minimum GPA.** No more than a total of 6 credits of CS Independent Study (4974) and/or CS Undergraduate Research (4994) may be used to fulfill Computer Science degree requirements. To take Independent Study (2974 or 4974), a minimum overall and in-major GPA of 2.5 is required. To take Undergraduate Research, a minimum overall GPA of 2.5 and an in-major GPA of 3.0 is required. Additionally, at least 6 credits of required CS 3000-level courses must have been completed before CS 4974 or CS 4994 may be taken.

I. **Writing Intensive Requirement:** Students who entered Virginia Tech prior to Fall 2005 are required to complete the Writing Intensive requirement. Although ENGL 3764 will satisfy this requirement, students do have the option of taking one of the courses on the following list to satisfy the requirement. Writing Intensive is only for students who entered Virginia Tech prior to Fall 2005.

Writing Intensive Courses Allowed for CS Majors

Warning: Some departments will be phasing out their Writing Intensive courses as the university transitions to departmental Visual Expression, Written & Spoken (ViEWS) requirements. Before you take any course listed below and assume it will meet the Writing Intensive requirement, get **written** verification from either the instructor or the offering department that the course is still approved as writing intensive for that semester. **Note:** Many of these courses are restricted to majors other than CS in certain semesters, and virtually all have prerequisites that must be met to be eligible to take the course.

Art and Art History

Art 3384
Art 3884

Interdisciplinary Studies

IDST 3114 IDST 4114
WS 2244 STS/WS 4704

Communication Studies

Comm 2024 Comm 3144
Comm 4144 Comm 3174

International Studies

IS 4004

Economics

Econ 4024 Econ 4924
Econ 4084

Music

Mus 3114 Mus 3134
Mus 3124 Mus 3144

English

Engl 2604 Engl 3764
Engl 3534 Engl 3774
Engl 3754 Engl 4784

Philosophy

Phil 4204 Phil 4334
Phil 4214 Phil 4604
Phil 4224 Phil 4614

Foreign Language and Literature

Fr 4154 Ger 3106 Span 3105
Fr 4314 Ger 4154 Span 4324
Lat 3004

Political Science

PSci 2024
PSci/UAP 3714

Geography

Geog 3224 Geog 3234

Psychology

Psyc 3054 Psyc 4364
Psyc 4354

History

Hist 1224 Hist 4004 Hist 4064
Hist 2004 Hist 4014 Hist 4074
Hist 2104H Hist 4024 Hist 4214
Hist 3264 Hist 4034 Hist 4224
Hist 3584 Hist 4044 Hist 4234
Hist 3594 Hist 4054 Hist 4244
Hist 3634

Sociology

Soc 3104

Theatre Arts

TA 2114
TA 3105
TA 3106