COLLEGE OF ENGINEERING
DEPARTMENT OF COMPUTER SCIENCE
**BACHELOR OF SCIENCE IN COMPUTER SCIENCE**
FOR STUDENTS GRADUATING IN CALENDAR YEAR 2018
123 CREDITS REQUIRED FOR GRADUATION

| FALL SEMESTER FRESHMAN 2014 | Credits | SPRING SEMESTER FRESHMAN 2015 | Credits |
|---|---|---|---|
| CHEM 1035 General Chemistry | 3 | ENGL 1106 First-Year Writing  *Pre: ENGL 1105* | 3 |
| CHEM 1045 General Chemistry Lab *Co: CHEM 1035* | 1 | MATH 1226 Calculus of a Single Variable  *Pre: MATH 1225(C-)* | 4 |
| ENGL 1105 First-Year Writing | 3 | PHYS 2305 Found of Physics I w/lab *Pre: MATH 1225;  Co: MATH 1226* | 4 |
| MATH 1225 Calculus of a Single Variable **(C-)** *Pre: Math Ready* | 4 | ENGE 1216 Foundations of Engineering  **(C-)** *Pre: ENGE 1215(C-)* | 2 |
| ENGE 1215 Foundations of Engineering  **(C-)**  *Co: MATH 1225* | 2 | CS 1114 Intro to Software Design **(C)** | 3 |
| CLE | 3 | | |
| **TOTAL** | **16** | **TOTAL** | **16** |

| FALL SEMESTER SOPHOMORE 2015 | Credits | SPRING SEMESTER SOPHOMORE 2016 | Credits |
|---|---|---|---|
| MATH 2204 Multivariable Calculus *Pre: MATH 1226* | 3 | COMM 2004 Public Speaking | 3 |
| MATH 2534 Introduction to Discrete Math *Pre: CS 1114(C) (Note: Math double majors take Math 3034)* | 3 | MATH 2114 Introduction to Linear Algebra *Pre: MATH 1226 or a grade of at least B in MATH 1225* | 3 |
| Natural Science Elective | 4 | CS 2505 Intro to Computer Organization I **(C)** *Pre: CS 2114 (C); Co: MATH 2534* | 3 |
| CS 1944 First Year Seminar | 1 | CLE | 3 |
| CS 2104 Intro to Problem Solving in CS **(C)** *Pre: MATH 1225* | 3 | CLE | 3 |
| CS 2114 Software Design & Data Structures **(C)** *Pre: CS 1114 (C)* | 3 | | |
| **TOTAL** | **17** | **TOTAL** | **15** |

| FALL SEMESTER JUNIOR 2016 | Credits | SPRING SEMESTER JUNIOR 2017 | Credits |
|---|---|---|---|
| MATH 3134 Appl Combinatorics & Graph Theory *Pre: MATH 2534 (Note: Math double majors take Math 3124)* | 3 | STAT 4705 Prob & Stat for Eng *Pre: MATH 2204* **–OR–** STAT 4714 Prob & Stat for EE *Pre: MATH 2204* | 3 |
| CS 2506 Intro to Computer Organization II **(C)** *Pre: 2505(C), 2114(C), MATH 2534* | 3 | CS 3214 Computer Systems *Pre: 2506(C), 2114(C)* | 3 |
| CS 3114 Data Structures and Algorithms **(C)**  *Pre: 2505(C), 2114(C), MATH 2534* | 3 | CS 3/4XXX Elective | 3 |
| ENGL 3764 Technical Writing | 3 | CS 3604 Professionalism in Computing *Pre: 3114(C), COMM 2004* | 3 |
| CLE | 3 | CLE | 3 |
| **TOTAL** | **15** | | **15** |

| FALL SEMESTER SENIOR 2017 | Credits | SPRING SEMESTER SENIOR 2018 | Credits |
|---|---|---|---|
| CS 3304 Comparative Languages *Pre: 3114(C)* | 3 | CS 4944 Senior Seminar | 1 |
| CS 41X4 Theory Course | 3 | CS 4XXX Capstone | 3 |
| CS 3/4XXX Elective | 3 | CS 4XXX Elective | 3 |
| CS Technical Elective | 3 | CLE | 3 |
| Free elective | 3 | Free Elective | 4 |
| | | | |
| **TOTAL** | **15** | **TOTAL** | **14** |

**Curriculum for Liberal Education (CLE)**

Consult the CLE Alphabetical Listing at: http://www.cle.prov.vt.edu/guides/alpha.html, CLE courses need to be completed prior to graduation

| | | | | |
|---|---|---|---|---|
| CLE Area 1: Writing and Discourse (6 hrs) | Met by ENGL 1105 | **(3)** | Met by ENGL 1106 | **(3)** |
| CLE Area 2: Ideas, Cultural Traditions, Values Electives (6 hrs) | | **(3)** | | **(3)** |
| CLE Area 3: Society & Human Behavior electives (6 hrs) | | **(3)** | | **(3)** |
| CLE Area 4: Scientific Reasoning and Discovery (8 hrs, sequence) | Met by natural science requirements (note 3 below) | **(4)** | Met by natural science requirements (note 3 below) | **(4)** |
| CLE Area 5: Quantitative and Symbolic Reasoning (8 hrs) | Met by MATH 1225 | **(4)** | Met by MATH 1226 | **(4)** |
| CLE Area 6: Creativity & Aesthetic Experience elective (1 or 3 hr) | | | | **(1-3)** |
| CLE Area 7: Global Issues Elective (3 hrs) | | | | **(3)** |

If a CLE course is double-counted to satisfy two different CLE areas, or a 1 credit course is used to satisfy Area 6, then free elective(s) must be taken to reach the 123 credits required for graduation.

**Additional Requirements and Notes:**

1. **Foreign Language Requirements.** Students must have had 2 years of a foreign language in high school or one year at the college level (6 credit hours) of the same language. College-level credits used to meet this requirement do not count towards the degree.
2. **CS 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 departments of Biological Sciences, Chemistry, Geosciences, Physics, Mathematics, and Statistics, and all departments in the College of Engineering, except for engineering courses satisfying CLE Area 7. Also excluded are courses listed as CS technical electives.
3. **Natural Science Elective**. A minimum of 12 hours of natural science is required. Of those hours, 8 hours must be in a sequence. In addition to the required Chem 1035/45 and Phys 2305, this requirement may be satisfied by taking (a) Chem 1036/46), (b) Phys 2306, or (c) an eight hour sequence in Biology: Bio 1005-6 & 1015-6, or Bio 1105-6 & 1115-6, or Bio 1105-6 & 1125-6.
4. **Independent Study/Undergraduate Research**. No more than a total of 6 credits of CS Independent Study (4974) and/or CS Undergraduate Research (4994) may be used to fulfill CS 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 (4994), a minimum overall GPA of 2.5 and an in-major GPA of 3.0 is required. CS 4974 and 4994 also require completion of CS 3114 with a grade of **C** or better.
5. **CS Technical Elective.** Any 3-credit CS 3/4/5000-level course not otherwise used to fulfill a CS requirement can be used as a technical elective. Alternately, any 3/4/5000-level non-CS course from an approved list can be used to meet this requirement.
6. **Capstone Requirement**. Students must complete one 4000-level capstone course. Students may choose from CS 4284, CS 4624, CS 4634, CS 4644, CS 4704, CS 4784, CS 4884 and other 4/5000-level CS courses that have received prior approval as fulfilling the capstone requirement.

**Change of Major Requirements.** Please see http://www.enge.vt.edu/undergraduate-changing-majors.html

**Satisfactory Progress Towards Degree.** University Policy 91 outlines university-wide minimum criteria to determine if students are making satisfactory progress towards the completion of their degrees. A CS major must do the following to maintain satisfactory progress towards the degree:

- Meet the minimum criteria as described in Policy 91 and summarized in the Undergraduate Catalog
- Be registered in at least one 3 credit course required in the major during each on-campus semester of the regular academic year
- Maintain an in-major GPA of at least 2.0 (The in-major GPA is calculated using all classes with a CS designator)
- Not take any CS course required in the major more than twice, including attempts ending in course withdrawal
- Not repeat more than 3 CS courses required in the major, including attempts ending in course withdrawal

**Prerequisites.** There are no hidden pre-requisites in this program of study. Prerequisites may change from what is indicated. Consult the University Catalog or check with your advisor for current requirements.

**Graduation Requirements.** To qualify for a B.S. degree in Computer Science, a student must:

- Earn a "C" (2.0) or better in CS 1114, CS 2104, CS 2114, CS 2505, CS 2506 and CS 3114, and
- Complete at least 123 semester credit hours with a minimum overall GPA of 2.00 and a minimum in-major GPA of 2.00.

## Computer Science Technical Electives

Computer Science majors must satisfy a 3 credit hour technical elective requirement.  This requirement can be met in either of the following two ways:

1. Any 3-credit CS 3/4/5000-level course not otherwise used to fulfill a Computer Science requirement can be used as a technical elective (except 3634), including both Independent Study (CS 4974) and Undergraduate Research (CS 4994).

2. An approved 3000- or 4000-level course in another discipline that has significant technical content relevant to the science or application of computer science can be used as a technical elective.

    a. 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.

    b. 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 4514, 4524, 4684
    ACIS/BIT 4554, 4564
    AOE 4434
    BIT 4434, 4444, 4514, 4544, 4574, 4614
    CMDA 3605, 3606, 4604
    COMM 4374
    ECE 3544, 4524, 4550, 4560, 4564, 4580, 4704, 4984 (depending on topic)
    GEOG 4314, 4324
    GEOG/GEOS 4084
    MATH 4175, 4176, 4445, 4454
    ME 4524
    MUS 3064, 3065