# BS in Computer Science

The B.S. in Computer Science provides a strong base in programming and problem-solving skills, a theoretical understanding of computer science, and practical experience in applying the computer to the solution of problems. Specialization is provided through numerous upper-division electives. The program offers concentrations in Secure Cyber Systems, Software Engineering, and Data Analytics.

## Marketable Skills

1. Students will be able to function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
2. Students will have the skills to communicate effectively in a variety of professional contexts.
3. Students will have the knowledge to design, implement, and evaluate a computing-based solution to meet given set of computing requirements.
4. Adaptability: Readily adjust to changing and complex situations, acquiring necessary skills and knowledge along the way.

## Educational Objectives

The B.S. in Computer Science program's educational objectives address the department's mission to serve the region, nation, and the world by graduating highly competitive students with the potential to become leaders in their profession.

- Our graduates will be innovative and productive problem solvers in industry, academia, and government who have the ability to apply theoretical and technical computer science knowledge to provide solutions to real-world problems of varying complexity (*Quality of our Graduates*).
- Our graduates will contribute to the economic health of the nation, in particular the Paso del Norte region, through technical expertise and complementary skills such as ability to work in interdisciplinary teams, lead, innovate, and apply entrepreneurial thinking with a global perspective (*Local and Global Impact*).
- Our graduates will remain at the forefront of computing through research, advanced studies, certification, entrepreneurship, or other means of self-advancement (*Continuous Learning*).

## Fast Track

The Fast-Track Program (http://catalog.utep.edu/admissions/undergraduate/fast-track/#text) enables outstanding undergraduate UTEP students to receive both undergraduate and graduate credit for up to 15 hours of UTEP course work as determined by participating Master's and Doctoral programs. Not all undergraduate programs have elected to participate in the Fast Track option, so students should see their departmental graduate advisor for information about requirements and guidelines. A list of courses that have been approved for possible use at the graduate level is found here (http://catalog.utep.edu/admissions/undergraduate/fast-track/#fasttrackcoursestext).

## Degree Plan

Required Credits: 120

| Code | Title | Hours |
|---|---|---|
| **University Core Curriculum** | | |
| Complete the University Core Curriculum requirements. (p. 4) | | 42 |
| **Computer Science Designated Core (All courses require a grade of C or better.)** | | |
| Required Courses: | | |
| CE 2326 | Econ for Engrs & Scientists | 3 |
| CS 1320 | Computer Programming Sci/Engr | 3 |
| MATH 1508 | Precalculus ((Listed if completed, but not required)) | 3-5 |
| or MATH 1310 | Trigonometry and Conics | |
| or MATH 1411 | Calculus I | |
| PHYS 2320<br>& PHYS 2120 | Introductory Mechanics<br>and Laboratory for PHYS 2320 | 4 |
| or PHYS 2420 | Introductory Mechanics | |
| Select one of the following lecture/lab combinations: | | 4 |
| BIOL 1305<br>& BIOL 1107 | General Biology<br>and Topics in Study of Life I | |
| BIOL 1306<br>& BIOL 1108 | Organismal Biology<br>and Organismal Biology Laboratory | |
| ASTR 1307<br>& ASTR 1107 | Elem Astronomy-Solar System<br>and Astronomy Lab I | |

| | | |
|---|---|---|
| CHEM 1305<br>& CHEM 1105 | General Chemistry<br>and Laboratory for CHEM 1305 | |
| CHEM 1306<br>& CHEM 1106 | General Chemistry<br>and Laboratory for CHEM 1306 | |
| GEOL 1313<br>& GEOL 1103 | Intro to Physical Geology<br>and Lab for GEOL 1313 | |
| GEOL 1314<br>& GEOL 1104 | Intro to Historical Geol<br>and Lab for GEOL 1314 | |
| PHYS 2321<br>& PHYS 2121 | Introductory Electromagnetism<br>and Laboratory for PHYS 2321 | |
| **Computer Science Core (All courses require a grade of C or better.)** | | |
| Required Courses: | | |
| CS 1301<br>& CS 1101 | Intro to Computer Science<br>and Intro to Computer Science Lab | 4 |
| CS 2302 | Data Structures | 3 |
| CS 2401 | Elem. Data Struct./Algorithms | 4 |
| ECE 2103 | Lab for ECE 2303 | 1 |
| ECE 2303 | Digital Systems Design I | 3 |
| MATH 1312 | Calculus II | 3 |
| MATH 1411 | Calculus I | 4 |
| MATH 2300 | Discrete Mathematics | 3 |
| or | | |
| CS 2101<br>& CS 2202 | Discrete Structures I<br>and Discrete Structures II | |
| **Computer Science Major** | | |
| Required Courses: | | |
| CS 3195 | Junior Professionl Orientation | 1 |
| CS 3331 | Adv. Object-Oriented Programng [C] | 3 |
| CS 3350 | Automata/Computabi/Formal Lang | 3 |
| CS 3360 | Programming Language Concepts | 3 |
| CS 3432 | Computer Organization [C] | 4 |
| CS 4175 | Parallel Computing | 1 |
| CS 4310 | Software Eng: Requirements Eng [C] | 3 |
| CS 4311 | Software Eng: Design & Implmnt | 3 |
| CS 4342 | Database Systems | 3 |
| CS 4375 | Operating Systems Concepts | 3 |
| MATH 3323 | Matrix Algebra | 3 |
| Statistics: | | |
| Select one of the following: | | 3 |
| ECE 3332 | Prob with App Elect/Comp Eng | |
| STAT 3320 | Probability and Statistics | |
| STAT 3330 | Probability | |
| **Additional Mathematics or Science Option:** | | |
| **Option A: Mathematics (Select one course from the following):** | | |
| MATH 2313 | Calculus III | |
| MATH 2325 | Intro. to Higher Mathematics | |
| MATH 2326 | Differential Equations | |
| MATH 3320 | Actuarial Mathematics | |
| MATH 3325 | Principles of Mathematics | |
| MATH 4329 | Numerical Analysis | |
| STAT 4380 | Statistics Inference | |
| STAT 4385 | Applied Regression Analysis | |
| **Option B: An additional 3 credit lecture course from the list of science courses above** | | |

| | | |
|---|---|---|
| Select an additional 3 hours from the list below that has NOT been used to satisfy the Lab-Lecture University Core Life and Physical Sciences requirement | | |
| ASTR 1307 | Elem Astronomy-Solar System | |
| BIOL 1305 | General Biology | |
| BIOL 1306 | Organismal Biology | |
| CHEM 1305 | General Chemistry | |
| CHEM 1306 | General Chemistry | |
| GEOL 1313 | Intro to Physical Geology | |
| GEOL 1314 | Intro to Historical Geol | |
| PHYS 2321 | Introductory Electromagnetism | |
| PHYS 2121 | Laboratory for PHYS 2321 | |
| **Technical Electives:** | | |
| Select 15 hours from the following: [1] | | 15 |
| CS 1110 | Intro to Problem Solving | 1 |
| CS 1120 | Computational Thinking | 1 |
| CS 1190 | Special Topics in Computing | 1 |
| CS 1290 | Special Topics in Computing | 2 |
| CS 2210 | Algo. Thinking in Prob. Solv. | 2 |
| CS 3000 or 4000 level course | | |
| Free Electives: | | |
| Complete three additional hours of free electives [2] | | 3 |
| **Total Hours** | | **120** |
| C Courses require a grade of C or better. | | |
| 1 CS 1110, CS 1120, CS 2210, CS 1190, CS 1290, CS 3000 or 4000 level course. No more than three credit hours of CS 1xxx and CS 2xxx can count for technical electives. No more than six credit hours of CS 1xxx, CS 2xxx, CS 4181, CS 4371, CS 4x73, CS 4392 and/or CS 4393 (in any combination) can count for technical electives. | | |
| 2 Courses that may be counted towards the free elective requirements are college-level courses offered by the college of Liberal Arts, Business, Science, or Engineering. Remedial courses cannot be counted as a free elective. | | |

## Concentrations

### Secure Cyber Systems

Students earning a B.S. in Computer Science can select a concentration in Secure Cyber-Systems by taking a set of courses with significant computer security content.  Students must take the following five courses:

- CS 4316 Computer Networks
- CS 4318 Wireless Networks
- CS 4351 Computer Security
- CS 4379 Software Reverse Engineering
- CS 4177 Software Vulnerabilities

### Software Engineering

Students earning a B.S. in Computer Science can select a concentration in Software Engineering by taking the following set of courses.

Students must take the following two courses:

- CS 4374 Software Construction
- CS 4387 Software Integration and V&V

Students must take one course from the following list:

- CS 4330 Mobile Application Development
- CS 4339 Secure Web-Based Systems
- CS 4371 Computer Science Problems
- CS 4373 Computer Science Internship
- CS 4381 Topics Software Engineering

### Data Analytics

Students earning a B.S. in Computer Science can select a concentration in Data Analytics by taking the following set of courses.

Student must take the following two courses:

- CS 4361 Machine Learning
- CS 4362 Data Mining

Students must take one course from the following list:

- CS 4363 Computer Vision
- CS 4364 Topics in Data Science

## University Core Curriculum

The department may make specific suggestions for courses which are most applicable towards your major.

All courses require a C or better

### I. Communication (six hours)

| Code | Title | Hours |
|---|---|---|
| Courses in this category focus on developing ideas and expressing them clearly, considering the effect of the message, fostering understanding, and building the skills needed to communicate persuasively. Courses involve the command of oral, aural, written, and visual literacy skills that enable people to exchange messages appropriate to the subject, occasion, and audience. | | |
| Select six hours of the following: | | 6 |
| For students whose secondary education was in English: | | |
| COMM 1611 | Written and Oral Communication | |
| ENGL 1313 | Writing About Literature | |
| RWS 1301 | Rhetoric & Composition I | |
| RWS 1302 | Rhetoric & Composition 2 | |
| RWS 1601 | Rhetoric, Composition & Comm | |
| For students whose secondary education was not in English: | | |
| ESOL 1311 | Expos Engl Compos-Spkr Esl | |
| ESOL 1312 | Res & Crit Writng Spkr Esl | |
| **Total Hours** | | **6** |

### II. American History (six hours)

| Code | Title | Hours |
|---|---|---|
| Courses in this category focus on the consideration of past events and ideas relative to the United States, with the option of including Texas History for a portion of this component area. Courses involve the interaction among individuals, communities, states, the nation, and the world, considering how these interactions have contributed to the development of the United States and its global role. | | |
| HIST 1301 | History of U.S. to 1865 | 3 |
| HIST 1302 | History of U.S. Since 1865 | 3 |
| **Total Hours** | | **6** |

### III. Language, Philosophy & Culture (three hours)

| Code | Title | Hours |
|---|---|---|
| Courses in this category focus on how ideas, values, beliefs, and other aspects of culture express and affect human experience. Courses involve the exploration of ideas that foster aesthetic and intellectual creation in order to understand the human condition across cultures. | | |
| Select one of the following: | | 3 |
| AFST 2300 | Intro-African Amer Studies | |
| CHIC 2302 | Latina/o Presence in the U.S. | |
| ENGL 2311 | English Literature | |
| ENGL 2312 | English Literature | |
| ENGL 2313 | Intro to American Fiction | |
| ENGL 2314 | Intro to American Drama | |
| ENGL 2318 | Intro to American Poetry | |

| | | |
|---|---|---|
| FREN 2322 | Making of the "Other" Americas | |
| HIST 2301 | World History to 1500 | |
| HIST 2302 | World History Since 1500 | |
| PHIL 1301 | Introduction to Philosophy | |
| PHIL 2306 | Ethics | |
| RS 1301 | Introduct to Religious Studies | |
| SPAN 2340 | Seeing & Naming: Conversations | |
| WS 2300 | Introduction to Womens Studies | |
| WS 2350 | Global Feminisms | |
| **Total Hours** | | **3** |

## IV. Mathematics (three hours)

| Code | Title | Hours |
|---|---|---|
| Courses in this category focus on quantitative literacy in logic, patterns, and relationships. Courses involve the understanding of key mathematical concepts and the application of appropriate quantitative tools to everyday experience. | | |
| Select one of the following: | | 3 |
| MATH 1309 | College Algebra | |
| MATH 1310 | Trigonometry and Conics | |
| MATH 1319 | Math in the Modern World | |
| MATH 1320 | Math for Social Sciences I | |
| MATH 1411 | Calculus I | |
| MATH 1508 | Precalculus [1,2] | |
| MATH 2301 | Math for Social Sciences II | |
| STAT 1380 | Statistical Literacy | |
| STAT 2480 | Elementary Statistical Methods | |
| 1 A higher-level course in the calculus sequence can be substituted. | | |
| 2 TCCN MATH 1314 will also satisfy this requirement. | | |
| **Total Hours** | | **3** |

## V. Life & Physical Sciences (six hours)

| Code | Title | Hours |
|---|---|---|
| Courses in this category focus on describing, explaining, and predicting natural phenomena using the scientific method. Courses involve the understanding of interactions among natural phenomena and the implications of scientific principles on the physical world and on experiences. | | |
| Select one of the following: | | 1-4 |
| ASTR 1107 | Astronomy Lab I | |
| ASTR 1307 | Elem Astronomy-Solar System | |
| ASTR 1308 | Elem Astr Stars & Galaxies | |
| BIOL 1103 | Introductory Biology Lab | |
| BIOL 1104 | Human Biology Laboratory | |
| BIOL 1107 | Topics in Study of Life I | |
| BIOL 1108 | Organismal Biology Laboratory | |
| BIOL 1203 | Introductory Biology | |
| BIOL 1304 | Human Biology | |
| BIOL 1305 | General Biology | |
| BIOL 1306 | Organismal Biology | |
| BIOL 2111 | Human Anat/Physio Lab I | |
| BIOL 2113 | Human Anat/Physio Lab II | |
| BIOL 2311 | Human Anat/Physiology I | |
| BIOL 2313 | Human Anat/Physiology II | |
| CHEM 1105 | Laboratory for CHEM 1305 | |
| CHEM 1106 | Laboratory for CHEM 1306 | |
| CHEM 1107 | Intro General Chemistry Lab | |
| CHEM 1108 | Intro Organic & Biochem Lab | |

| | | |
|---|---|---|
| CHEM 1305 | General Chemistry | |
| CHEM 1306 | General Chemistry | |
| CHEM 1307 | Intro to General Chemistry | |
| CHEM 1308 | Intro Organic & Biochemistry | |
| ESCI 1101 | Environmental Sci. Lab | |
| ESCI 1102 | Non-major Lab for ESCI 1301 | |
| ESCI 1202 | Intro to Environment Science 2 | |
| ESCI 1301 | Intro to Environmental Sci | |
| GEOG 1106 | Laboratory for GEOG 1306 | |
| GEOG 1306 | Physical Geography | |
| GEOL 1103 | Lab for GEOL 1313 | |
| GEOL 1104 | Lab for GEOL 1314 | |
| GEOL 1111 | Principles of Earth Sci - Lab | |
| GEOL 1112 | Laboratory for Geology 1212 | |
| GEOL 1211 | Principles of Earth Sciences | |
| GEOL 1212 | Principles of Earth Science | |
| GEOL 1230 | The Blue Planet | |
| GEOL 1231 | Natural Hazards | |
| GEOL 1313 | Intro to Physical Geology | |
| GEOL 1314 | Intro to Historical Geol | |
| HSCI 2302 | Fundamentals of Nutrition | |
| HSCI 2303 | Wellness Dynamics | |
| MICR 2330 | Microorganisms and Disease | |
| PHYS 1403 | General Physics I | |
| PHYS 1404 | General Physics II | |
| PHYS 2120 | Laboratory for PHYS 2320 | |
| PHYS 2121 | Laboratory for PHYS 2321 | |
| PHYS 2320 | Introductory Mechanics | |
| PHYS 2321 | Introductory Electromagnetism | |
| **Total Hours** | | **6** |

## VI. Political Science (six hours)

| Code | Title | Hours |
|---|---|---|
| Courses in this category focus on consideration of the Constitution of the United States and the constitutions of the states, with special emphasis on that of Texas. Courses involve the analysis of governmental institutions, political behavior, civic engagement, and their political and philosophical foundations. | | |
| Required Courses: | | |
| POLS 2310 | Introduction to Politics | 3 |
| POLS 2311 | American Gover & Politics | 3 |
| **Total Hours** | | **6** |

## VII. Social and Behavioral Sciences (three hours)

| Code | Title | Hours |
|---|---|---|
| Courses in this category focus on the application of empirical and scientific methods that contribute to the understanding of what makes us human. Courses involve the exploration of behavior and interactions among individuals, groups, institutions, and events, examining their impact on the individual, society, and culture. | | |
| Select one of the following: | | 3 |
| ANTH 1301 | Intro-Phys Anth/Archeolog | |
| ANTH 1302 | Intro-Cultural Anthropology | |
| ANTH 1310 | Cultural Geography | |
| ANTH 2320 | Intro to Linguistics | |
| CE 2326 | Econ for Engrs & Scientists | |
| CHIC 2311 | Intro to Chicano Studies | |

| | | |
|---|---|---|
| ASIA 2300 | Asian American Studies | |
| COMM 2350 | Interpersonal Communication | |
| COMM 2372 | Mass Media and Society | |
| ECON 2303 | Principles of Macroeconomics | |
| ECON 2304 | Principles of Microeconomics | |
| EDPC 1301 | Introduction to Ed Psychology | |
| EDU 1342 | Action Research in Classrooms | |
| ENGL 2320 | Introduction to Linguistics | |
| GEOG 1310 | Cultural Geography | |
| LEAD 2300 | Leadership in Action | |
| LING 2320 | Introduction to Linguistics | |
| LING 2340 | Lang. Inside & Out: Sel Topics | |
| PSYC 1301 | Introduction to Psychology | |
| SOCI 1301 | Introduction to Sociology | |
| SOCI 1310 | Cultural Geography | |
| **Total Hours** | | **3** |

## VIII. Creative Arts (three hours)

| Code | Title | Hours |
|---|---|---|
| Courses in this category focus on the appreciation and analysis of creative artifacts and works of the human imagination. Courses involve the synthesis and interpretation of artistic expression and enable critical, creative, and innovative communication about works of art. | | |
| Select one of the following: | | 3 |
| ART 1300 | Art Appreciation | |
| ARTH 1305 | History of Art I | |
| ARTH 1306 | History of Art II | |
| CHIC 1311 | Chicana/o Fine Arts Appreciat | |
| DANC 1304 | Introduction to Dance | |
| FILM 1390 | Intro-Art of Motion Pict. | |
| MUSL 1324 | Music Appreciation | |
| MUSL 1327 | Jazz to Rock | |
| MUSL 2321 | Music, Culture, and Society | |
| THEA 1313 | Introduction to Theatre | |
| **Total Hours** | | **3** |

## IX. Component Area Option (six hours)

| Code | Title | Hours |
|---|---|---|
| a. A minimum of 3 SCH must meet the definition and corresponding Core Objectives specified in one of the foundational component areas. b. As an option for up to 3 semester credit hours of the Component Area Option, an institution may select course(s) that: (i) Meet(s) the definition specified for one or more of the foundational component areas; and (ii) Include(s) a minimum of three Core Objectives, including Critical Thinking Skills, Communication Skills, and one of the remaining Core Objectives of the institution's choice. | | |
| BUSN 1301 | Intro to Global Business | |
| COMM 1301 | Public Speaking | |
| COMM 1302 | Business/Profession Comm | |
| CS 1310 | Intro-Computational Thinking | |
| CS 1320 | Computer Programming Sci/Engr | |
| EL 1301 | Eng Innovation and Leadership | |
| ENGR 1302 | Engineering Design Experience | |
| ENGR 1303 | Applied Engineering Analysis | |
| LEAD 1300 | Introduction to Leadership | |
| SCI 1301 | Inquiry in Math & Science | |
| SPLP 1312 | Comm. Var. Across the Lifespan | |

| | | |
|---|---|---|
| UNIV 1301 | Seminar/Critical Inquiry | |
| **Total Hours** | | **0** |

## 4-Year Sample Degree Plan

### BS in Computer Science (Starting with Pre-Calculus)

| Code | Title | Hours |
|---|---|---|
| **BS COMPUTER SCIENCE** | | |
| **Summer** | | |
| (prior to first fall semester if needed) | | |
| MATH 1508 | Precalculus | 3-5 |
| or MATH 1310 | Trigonometry and Conics | |
| **FRESHMAN** | | |
| **Fall** | | |
| CS 1101 | Intro to Computer Science Lab | 1 |
| CS 1301 | Intro to Computer Science | 3 |
| CS 1310 | Intro-Computational Thinking (*) | 3 |
| CS 2101 | Discrete Structures I | 1 |
| MATH 1411 | Calculus I (*) | 4 |
| RWS 1301 | Rhetoric & Composition I (*) | 3 |
| **Spring** | | |
| CS 2202 | Discrete Structures II | 2 |
| CS 2401 | Elem. Data Struct./Algorithms | 4 |
| HIST 1301 | History of U.S. to 1865 | 3 |
| RWS 1302 | Rhetoric & Composition 2 | 3 |
| UNIV 1301 | Seminar/Critical Inquiry | 3 |
| **SOPHOMORE** | | |
| **Fall** | | |
| CS 2302 | Data Structures | 3 |
| ECE 2103 | Lab for ECE 2303 | 1 |
| ECE 2303 | Digital Systems Design I | 3 |
| HIST 1302 | History of U.S. Since 1865 | 3 |
| MATH 1312 | Calculus II | 3 |
| Social and Behavioral Sciences * | | 3 |
| **Spring** | | |
| CS 3350 | Automata/Computabi/Formal Lang | 3 |
| PHYS 2320 | Introductory Mechanics | 3 |
| PHYS 2120 | Laboratory for PHYS 2320 | 1 |
| POLS 2310 | Introduction to Politics | 3 |
| Creative Arts * | | 3 |
| Language, Philosophy and Culture * | | 3 |
| **JUNIOR** | | |
| **Fall** | | |
| CS 3331 | Adv. Object-Oriented Programng | 3 |
| CS 3432 | Computer Organization | 4 |
| MATH 3323 | Matrix Algebra | 3 |
| POLS 2311 | American Gover & Politics | 3 |
| Additional Math or Science Lecture | | 3 |
| **Spring** | | |
| CS 3195 | Junior Professionl Orientation | 1 |
| CS 4375 | Operating Systems Concepts | 3 |
| Life and Physical Science Lecture and Lab | | 4 |
| Technical Elective | | 3 |

| | | |
|---|---|---|
| Technical Elective | | 3 |
| **SENIOR** | | |
| **Fall** | | |
| CS 3360 | Programming Language Concepts | 3 |
| CS 4310 | Software Eng: Requirements Eng | 3 |
| CS 4342 | Database Systems | 3 |
| STAT 3320 | Probability and Statistics | 3 |
| Technical Elective | | 3 |
| **Spring** | | |
| CS 4175 | Parallel Computing | 1 |
| CS 4311 | Software Eng: Design & Implmnt | 3 |
| Free Elective | | 3 |
| Technical Elective | | 3 |
| Technical Elective | | 2 |

**Notes:**

- Courses that are part of the University Core Curriculum.

• Life and Physical Sciences. In addition to PHYS 2420, students must complete one semester of lecture and associated lab. Acceptable courses are: ASTR 1307 Elem Astronomy-Solar System and ASTR 1107 Astronomy Lab I, PHYS 2421 Introductory Electromagnetism, BIOL 1305 General Biology and BIOL 1107 Topics in Study of Life I, BIOL 1306 Organismal Biology and BIOL 1108 Organismal Biology Laboratory, CHEM 1305 General Chemistry and CHEM 1105 Laboratory for CHEM 1305, CHEM 1306 General Chemistry and CHEM 1106 Laboratory for CHEM 1306, GEOL 1313 Intro to Physical Geology and GEOL 1103 Lab for GEOL 1313, GEOL 1314 Intro to Historical Geology and GEOL 1104 Lab for GEOL 1314. Courses that count towards the core curriculum (2 lectures and a lab associated with one of the 2 lectures) require grade C or better.

• Additional Mathematics or Science Option. Option A: Mathematics: MATH 2313, 2325, 2336, 3320, 3325, 4329, STAT 3381, 4380, 4385 Option B: Science. An additional 3-credit lecture course from the list of Life and Physical Science courses which was not used to satisfy the science lecture/lab requirement.

• Technical Electives: 15 hours from the following: CS 1110 Intro to Problem Solving, CS 1120 Computational Thinking, CS 2210 Algo Thinking in Prob Solv, CS 1190 Special Topics in Computing, CS 1290 Special Topics in Computing, and any CS 3000 or 4000 level courses that are not required upper level CS courses . No more than three credit hours of CS 1XXX and CS 2XXX can count for technical electives. No more than six credit hours of CS 1XXX, CS 2XXX, CS 4181 Undergraduate Seminar, CS 4371 Computer Science Problems, CS 4X73, CS 4392 Rsrch Methods/Computer Science and/or CS 4393 Senior Project (in any combination) can count for technical electives.

• Free Elective. Courses that may be counted towards the free elective requirement are college-level courses (not remedial) offered by the college of Liberal Arts, Business, Science, or Engineering.

| | |
|---|---|
| **Total Hours** | **122-124** |

## BS in Computer Science (Starting with Calculus)

| Code | Title | Hours |
|---|---|---|
| **BS COMPUTER SCIENCE** | | |
| **FRESHMAN** | | |
| **Fall** | | |
| RWS 1301 | Rhetoric & Composition I (*) | 3 |
| CS 1310 | Intro-Computational Thinking (*) | 3 |
| MATH 1411 | Calculus I (*) | 4 |
| CS 1301 | Intro to Computer Science | 3 |
| CS 1101 | Intro to Computer Science Lab | 1 |
| CS 2101 | Discrete Structures I | 1 |
| **Spring** | | |
| HIST 1301 | History of U.S. to 1865 | 3 |
| RWS 1302 | Rhetoric & Composition 2 | 3 |
| UNIV 1301 | Seminar/Critical Inquiry | 3 |
| CS 2401 | Elem. Data Struct./Algorithms | 4 |
| CS 2202 | Discrete Structures II | 2 |
| **SOPHOMORE** | | |
| **Fall** | | |

| | | |
|---|---|---|
| HIST 1302 | History of U.S. Since 1865 | 3 |
| Social and Behavioral Sciences * | | 3 |
| MATH 1312 | Calculus II | 3 |
| CS 2302 | Data Structures | 3 |
| ECE 2103 | Lab for ECE 2303 | 1 |
| ECE 2303 | Digital Systems Design I | 3 |
| **Spring** | | |
| POLS 2310 | Introduction to Politics | 3 |
| Language, Philosophy and Culture * | | 3 |
| Creative Arts * | | 3 |
| CS 3350 | Automata/Computabi/Formal Lang | 3 |
| PHYS 2320 | Introductory Mechanics | 3 |
| PHYS 2120 | Laboratory for PHYS 2320 | 1 |
| **JUNIOR** | | |
| **Fall** | | |
| POLS 2311 | American Gover & Politics | 3 |
| MATH 3323 | Matrix Algebra | 3 |
| CS 3331 | Adv. Object-Oriented Programng | 3 |
| CS 3432 | Computer Organization | 4 |
| Additional Math or Science Lecture | | 3 |
| **Spring** | | |
| Life and Physical Science Lecture and Lab | | 4 |
| CS 3195 | Junior Professionl Orientation | 1 |
| CS 4375 | Operating Systems Concepts | 3 |
| Technical Elective | | 3 |
| Technical Elective | | 3 |
| **SENIOR** | | |
| **Fall** | | |
| CS 3360 | Programming Language Concepts | 3 |
| CS 4310 | Software Eng: Requirements Eng | 3 |
| CS 4342 | Database Systems | 3 |
| STAT 3320 | Probability and Statistics | 3 |
| Technical Elective | | 3 |
| **Spring** | | |
| CS 4175 | Parallel Computing | 1 |
| CS 4311 | Software Eng: Design & Implmnt | 3 |
| Free Elective | | 3 |
| Technical Elective | | 3 |
| Technical Elective | | 2 |

**Notes:**

- Courses that are part of the University Core Curriculum.

• Life and Physical Sciences. In addition to PHYS 2420, students must complete one semester of lecture and associated lab. Acceptable courses are: ASTR 1307 Elem Astronomy-Solar System and ASTR 1107 Astronomy Lab I, PHYS 2421 Introductory Electromagnetism, BIOL 1305 General Biology and BIOL 1107 Topics in Study of Life I, BIOL 1306 Organismal Biology and BIOL 1108 Organismal Biology Laboratory, CHEM 1305 General Chemistry and CHEM 1105 Laboratory for CHEM 1305, CHEM 1306 General Chemistry and CHEM 1106 Laboratory for CHEM 1306, GEOL 1313 Intro to Physical Geology and GEOL 1103 Lab for GEOL 1313, GEOL 1314 Intro to Historical Geology and GEOL 1104 Lab for GEOL 1314. Courses that count towards the core curriculum (2 lectures and a lab associated with one of the 2 lectures) require grade C or better.

• Additional Mathematics or Science Option. Option A: Mathematics: MATH 2313, 2325, 2336, 3320, 3325, 4329, STAT 3381, 4380, 4385 Option B: Science. An additional 3-credit lecture course from the list of Life and Physical Science courses which was not used to satisfy the science lecture/lab requirement.

| | |
|---|---|
| • Technical Electives: 15 hours from the following: CS 1110 Intro to Problem Solving, CS 1120 Computational Thinking, CS 2210 Algo Thinking in Prob Solv, CS 1190 Special Topics in Computing, CS 1290 Special Topics in Computing, and any CS 3000 or 4000 level courses that are not required upper level CS courses . No more than three credit hours of CS 1XXX and CS 2XXX can count for technical electives. No more than six credit hours of CS 1XXX, CS 2XXX, CS 4181 Undergraduate Seminar, CS 4371 Computer Science Problems, CS 4X73, CS 4392 Rsrch Methods/Computer Science and/or CS 4393 Senior Project (in any combination) can count for technical electives. | |
| • Free Elective. Courses that may be counted towards the free elective requirement are college-level courses (not remedial) offered by the college of Liberal Arts, Business, Science, or Engineering. | |
| **Total Hours** | **119** |

## BS in Computer Science Concentration Data Analytics (Starting with Pre-Calculus)

| Code | Title | Hours |
|---|---|---|
| **BS COMPUTER SCIENCE CONCENTRATION IN DATA ANALYTICS** | | |
| **Summer** | | |
| (prior to first fall semester if needed) | | |
| MATH 1508 | Precalculus | 3-5 |
| or MATH 1310 | Trigonometry and Conics | |
| **FRESHMAN** | | |
| **Fall** | | |
| CS 1101 | Intro to Computer Science Lab | 1 |
| CS 1301 | Intro to Computer Science | 3 |
| CS 1310 | Intro-Computational Thinking (*) | 3 |
| CS 2101 | Discrete Structures I | 1 |
| MATH 1411 | Calculus I (*) | 4 |
| RWS 1301 | Rhetoric & Composition I (*) | 3 |
| **Spring** | | |
| CS 2202 | Discrete Structures II | 2 |
| CS 2401 | Elem. Data Struct./Algorithms | 4 |
| HIST 1301 | History of U.S. to 1865 | 3 |
| RWS 1302 | Rhetoric & Composition 2 | 3 |
| UNIV 1301 | Seminar/Critical Inquiry | 3 |
| **SOPHOMORE** | | |
| **Fall** | | |
| CS 2302 | Data Structures | 3 |
| ECE 2103 | Lab for ECE 2303 | 1 |
| ECE 2303 | Digital Systems Design I | 3 |
| HIST 1302 | History of U.S. Since 1865 | 3 |
| MATH 1312 | Calculus II | 3 |
| Social and Behavioral Sciences * | | 3 |
| **Spring** | | |
| CS 3350 | Automata/Computabi/Formal Lang | 3 |
| PHYS 2320 | Introductory Mechanics | 3 |
| PHYS 2120 | Laboratory for PHYS 2320 | 1 |
| POLS 2310 | Introduction to Politics | 3 |
| Creative Arts * | | 3 |
| Language, Philosophy and Culture * | | 3 |
| **JUNIOR** | | |
| **Fall** | | |
| CS 3331 | Adv. Object-Oriented Programng | 3 |
| CS 3432 | Computer Organization | 4 |
| MATH 3323 | Matrix Algebra | 3 |
| POLS 2311 | American Gover & Politics | 3 |
| Additional Math or Science Lecture | | 3 |
| **Spring** | | |

| | | |
|---|---|---|
| CS 3195 | Junior Professionl Orientation | 1 |
| CS 4363 | Computer Vision | 3 |
| or CS 4364 | Topics in Data Science | |
| CS 4375 | Operating Systems Concepts | 3 |
| Life and Physical Science Lecture and Lab | | 4 |
| Technical Elective | | 3 |
| **SENIOR** | | |
| **Fall** | | |
| CS 3360 | Programming Language Concepts | 3 |
| CS 4310 | Software Eng: Requirements Eng | 3 |
| CS 4342 | Database Systems | 3 |
| CS 4361 | Machine Learning | 3 |
| STAT 3320 | Probability and Statistics | 3 |
| **Spring** | | |
| CS 4175 | Parallel Computing | 1 |
| CS 4311 | Software Eng: Design & Implmnt | 3 |
| CS 4362 | Data Mining | 3 |
| Free Elective | | 3 |
| Technical Elective | | 2 |

**Notes:**

- Courses that are part of the University Core Curriculum.

• Life and Physical Sciences. In addition to PHYS 2420, students must complete one semester of lecture and associated lab. Acceptable courses are: ASTR 1307 Elem Astronomy-Solar System and ASTR 1107 Astronomy Lab I, PHYS 2421 Introductory Electromagnetism, BIOL 1305 General Biology and BIOL 1107 Topics in Study of Life I, BIOL 1306 Organismal Biology and BIOL 1108 Organismal Biology Laboratory, CHEM 1305 General Chemistry and CHEM 1105 Laboratory for CHEM 1305, CHEM 1306 General Chemistry and CHEM 1106 Laboratory for CHEM 1306, GEOL 1313 Intro to Physical Geology and GEOL 1103 Lab for GEOL 1313, GEOL 1314 Intro to Historical Geology and GEOL 1104 Lab for GEOL 1314. Courses that count towards the core curriculum (2 lectures and a lab associated with one of the 2 lectures) require grade C or better.

• Additional Mathematics or Science Option. Option A: Mathematics: MATH 2313, 2325, 2336, 3320, 3325, 4329, STAT 3381, 4380, 4385 Option B: Science. An additional 3-credit lecture course from the list of Life and Physical Science courses which was not used to satisfy the science lecture/lab requirement.

• Technical Electives: 3 hours from CS4363 or CS4364. In addition, the student will have to complete 6 from the following: CS 1110 Intro to Problem Solving, CS 1120 Computational Thinking, CS 2210 Algo Thinking in Prob Solv, CS 1190 Special Topics in Computing, CS 1290 Special Topics in Computing, and any CS 3000 or 4000 level courses that are not required upper level CS courses . No more than three credit hours of CS 1XXX and CS 2XXX can count for technical electives. No more than six credit hours of CS 1XXX, CS 2XXX, CS 4181 Undergraduate Seminar, CS 4371 Computer Science Problems, CS 4X73, CS 4392 Rsrch Methods/Computer Science and/or CS 4393 Senior Project (in any combination) can count for technical electives.

• Free Elective. Courses that may be counted towards the free elective requirement are college-level courses (not remedial) offered by the college of Liberal Arts, Business, Science, or Engineering.

| | |
|---|---|
| **Total Hours** | **122-124** |

## BS in Computer Science Concentration Data Analytics (Starting with Calculus)

| Code | Title | Hours |
|---|---|---|
| **BS COMPUTER SCIENCE CONCENTRATION IN DATA ANALYTICS** | | |
| **FRESHMAN** | | |
| **Fall** | | |
| CS 1101 | Intro to Computer Science Lab | 1 |
| CS 1301 | Intro to Computer Science | 3 |
| CS 1310 | Intro-Computational Thinking (*) | 3 |
| CS 2101 | Discrete Structures I | 1 |
| MATH 1411 | Calculus I (*) | 4 |
| RWS 1301 | Rhetoric & Composition I (*) | 3 |
| **Spring** | | |
| CS 2202 | Discrete Structures II | 2 |

| | | |
|---|---|---|
| CS 2401 | Elem. Data Struct./Algorithms | 4 |
| HIST 1301 | History of U.S. to 1865 | 3 |
| RWS 1302 | Rhetoric & Composition 2 | 3 |
| UNIV 1301 | Seminar/Critical Inquiry | 3 |
| **SOPHOMORE** | | |
| **Fall** | | |
| CS 2302 | Data Structures | 3 |
| ECE 2103 | Lab for ECE 2303 | 1 |
| ECE 2303 | Digital Systems Design I | 3 |
| HIST 1302 | History of U.S. Since 1865 | 3 |
| MATH 1312 | Calculus II | 3 |
| Social and Behavioral Sciences * | | 3 |
| **Spring** | | |
| CS 3350 | Automata/Computabi/Formal Lang | 3 |
| PHYS 2320 | Introductory Mechanics | 3 |
| PHYS 2120 | Laboratory for PHYS 2320 | 1 |
| POLS 2310 | Introduction to Politics | 3 |
| Creative Arts * | | 3 |
| Language, Philosophy and Culture * | | 3 |
| **JUNIOR** | | |
| **Fall** | | |
| CS 3331 | Adv. Object-Oriented Programng | 3 |
| CS 3432 | Computer Organization | 4 |
| MATH 3323 | Matrix Algebra | 3 |
| POLS 2311 | American Gover & Politics | 3 |
| Additional Math or Science Lecture | | 3 |
| **Spring** | | |
| CS 3195 | Junior Professionl Orientation | 1 |
| CS 4363 | Computer Vision | 3 |
| or CS 4364 | Topics in Data Science | |
| CS 4375 | Operating Systems Concepts | 3 |
| Life and Physical Science Lecture and Lab | | 4 |
| Technical Elective | | 3 |
| **SENIOR** | | |
| **Fall** | | |
| CS 3360 | Programming Language Concepts | 3 |
| CS 4310 | Software Eng: Requirements Eng | 3 |
| CS 4342 | Database Systems | 3 |
| CS 4361 | Machine Learning | 3 |
| STAT 3320 | Probability and Statistics | 3 |
| **Spring** | | |
| CS 4175 | Parallel Computing | 1 |
| CS 4311 | Software Eng: Design & Implmnt | 3 |
| CS 4362 | Data Mining | 3 |
| Free Elective | | 3 |
| Technical Elective | | 2 |

**Notes:**

- Courses that are part of the University Core Curriculum.

| | |
|---|---|
| • Life and Physical Sciences. In addition to PHYS 2420, students must complete one semester of lecture and associated lab. Acceptable courses are: ASTR 1307 Elem Astronomy-Solar System and ASTR 1107 Astronomy Lab I, PHYS 2421 Introductory Electromagnetism, BIOL 1305 General Biology and BIOL 1107 Topics in Study of Life I, BIOL 1306 Organismal Biology and BIOL 1108 Organismal Biology Laboratory, CHEM 1305 General Chemistry and CHEM 1105 Laboratory for CHEM 1305, CHEM 1306 General Chemistry and CHEM 1106 Laboratory for CHEM 1306, GEOL 1313 Intro to Physical Geology and GEOL 1103 Lab for GEOL 1313, GEOL 1314 Intro to Historical Geology and GEOL 1104 Lab for GEOL 1314. Courses that count towards the core curriculum (2 lectures and a lab associated with one of the 2 lectures) require grade C or better. | |
| • Additional Mathematics or Science Option. Option A: Mathematics: MATH 2313, 2325, 2336, 3320, 3325, 4329, STAT 3381, 4380, 4385 Option B: Science. An additional 3-credit lecture course from the list of Life and Physical Science courses which was not used to satisfy the science lecture/lab requirement. | |
| • Technical Electives: 3 hours from CS4363 or CS4364. In addition, the student will have to complete 6 from the following: CS 1110 Intro to Problem Solving, CS 1120 Computational Thinking, CS 2210 Algo Thinking in Prob Solv, CS 1190 Special Topics in Computing, CS 1290 Special Topics in Computing, and any CS 3000 or 4000 level courses that are not required upper level CS courses . No more than three credit hours of CS 1XXX and CS 2XXX can count for technical electives. No more than six credit hours of CS 1XXX, CS 2XXX, CS 4181 Undergraduate Seminar, CS 4371 Computer Science Problems, CS 4X73, CS 4392 Rsrch Methods/Computer Science and/or CS 4393 Senior Project (in any combination) can count for technical electives. | |
| • Free Elective. Courses that may be counted towards the free elective requirement are college-level courses (not remedial) offered by the college of Liberal Arts, Business, Science, or Engineering. | |
| **Total Hours** | **119** |

## BS in Computer Science Concentration Secure Cyber Systems (Starting with Pre-Calculus)

| Code | Title | Hours |
|---|---|---|
| **BS COMPUTER SCIENCE CONCENTRATION IN SECURE CYBER SYSTEMS** | | |
| **Summer** | | |
| (prior to first fall semester if needed) | | |
| MATH 1508 | Precalculus | 3-5 |
| or MATH 1310 | Trigonometry and Conics | |
| **FRESHMAN** | | |
| **Fall** | | |
| CS 1101 | Intro to Computer Science Lab | 1 |
| CS 1301 | Intro to Computer Science | 3 |
| CS 1310 | Intro-Computational Thinking (*) | 3 |
| CS 2101 | Discrete Structures I | 1 |
| MATH 1411 | Calculus I (*) | 4 |
| RWS 1301 | Rhetoric & Composition I (*) | 3 |
| **Spring** | | |
| CS 2202 | Discrete Structures II | 2 |
| CS 2401 | Elem. Data Struct./Algorithms | 4 |
| HIST 1301 | History of U.S. to 1865 | 3 |
| RWS 1302 | Rhetoric & Composition 2 | 3 |
| UNIV 1301 | Seminar/Critical Inquiry | 3 |
| **SOPHOMORE** | | |
| **Fall** | | |
| CS 2302 | Data Structures | 3 |
| ECE 2103 | Lab for ECE 2303 | 1 |
| ECE 2303 | Digital Systems Design I | 3 |
| HIST 1302 | History of U.S. Since 1865 | 3 |
| MATH 1312 | Calculus II | 3 |
| Social and Behavioral Sciences * | | 3 |
| **Spring** | | |
| CS 3350 | Automata/Computabi/Formal Lang | 3 |
| PHYS 2320 | Introductory Mechanics | 3 |
| PHYS 2120 | Laboratory for PHYS 2320 | 1 |
| POLS 2310 | Introduction to Politics | 3 |

| | | |
|---|---|---|
| Language, Philosophy and Culture * | | 3 |
| Creative Arts * | | 3 |
| **JUNIOR** | | |
| **Fall** | | |
| CS 3331 | Adv. Object-Oriented Programng | 3 |
| CS 3432 | Computer Organization | 4 |
| MATH 3323 | Matrix Algebra | 3 |
| POLS 2311 | American Gover & Politics | 3 |
| Additional Math or Science Lecture | | 3 |
| **Spring** | | |
| CS 3195 | Junior Professionl Orientation | 1 |
| CS 4316 | Computer Networks | 3 |
| CS 4351 | Computer Security | 3 |
| CS 4375 | Operating Systems Concepts | 3 |
| Life and Physical Science Lecture and Lab | | 4 |
| **SENIOR** | | |
| **Fall** | | |
| CS 3360 | Programming Language Concepts | 3 |
| CS 4177 | Software Vulnerabilities | 1 |
| CS 4310 | Software Eng: Requirements Eng | 3 |
| CS 4342 | Database Systems | 3 |
| STAT 3320 | Probability and Statistics | 3 |
| Technical Elective | | 2 |
| **Spring** | | |
| CS 4175 | Parallel Computing | 1 |
| CS 4311 | Software Eng: Design & Implmnt | 3 |
| CS 4318 | Wireless Networks | 3 |
| CS 4379 | Software Reverse Engineering | 3 |
| Free Elective | | 3 |

**Notes:**

- Courses that are part of the University Core Curriculum.

• Life and Physical Sciences. In addition to PHYS 2420, students must complete one semester of lecture and associated lab. Acceptable courses are: ASTR 1307 Elem Astronomy-Solar System and ASTR 1107 Astronomy Lab I, PHYS 2421 Introductory Electromagnetism, BIOL 1305 General Biology and BIOL 1107 Topics in Study of Life I, BIOL 1306 Organismal Biology and BIOL 1108 Organismal Biology Laboratory, CHEM 1305 General Chemistry and CHEM 1105 Laboratory for CHEM 1305, CHEM 1306 General Chemistry and CHEM 1106 Laboratory for CHEM 1306, GEOL 1313 Intro to Physical Geology and GEOL 1103 Lab for GEOL 1313, GEOL 1314 Intro to Historical Geology and GEOL 1104 Lab for GEOL 1314. Courses that count towards the core curriculum (2 lectures and a lab associated with one of the 2 lectures) require grade C or better.

• Additional Mathematics or Science Option. Option A: Mathematics: MATH 2313, 2325, 2336, 3320, 3325, 4329, STAT 3381, 4380, 4385 Option B: Science. An additional 3-credit lecture course from the list of Life and Physical Science courses which was not used to satisfy the science lecture/lab requirement.

• Technical Electives: 2 hours from the following: CS 1110 Intro to Problem Solving, CS 1120 Computational Thinking, CS 2210 Algo Thinking in Prob Solv, CS 1190 Special Topics in Computing, CS 1290 Special Topics in Computing, and any CS 3000 or 4000 level courses that are not required upper level CS courses . No more than three credit hours of CS 1XXX and CS 2XXX can count for technical electives. No more than six credit hours of CS 1XXX, CS 2XXX, CS 4181 Undergraduate Seminar, CS 4371 Computer Science Problems, CS 4X73, CS 4392 Rsrch Methods/Computer Science and/or CS 4393 Senior Project (in any combination) can count for technical electives.

• Free Elective. Courses that may be counted towards the free elective requirement are college-level courses (not remedial) offered by the college of Liberal Arts, Business, Science, or Engineering.

| | |
|---|---|
| **Total Hours** | **123-125** |

## BS in Computer Science Concentration Secure Cyber Systems (Starting with Calculus)

| Code | Title | Hours |
|---|---|---|
| **BS COMPUTER SCIENCE CONCENTRATION IN SECURE CYBER SYSTEMS** | | |
| **FRESHMAN** | | |

| | | |
|---|---|---|
| **Fall** | | |
| CS 1101 | Intro to Computer Science Lab | 1 |
| CS 1301 | Intro to Computer Science | 3 |
| CS 1310 | Intro-Computational Thinking (*) | 3 |
| CS 2101 | Discrete Structures I | 1 |
| MATH 1411 | Calculus I (*) | 4 |
| RWS 1301 | Rhetoric & Composition I (*) | 3 |
| **Spring** | | |
| CS 2202 | Discrete Structures II | 2 |
| CS 2401 | Elem. Data Struct./Algorithms | 4 |
| HIST 1301 | History of U.S. to 1865 | 3 |
| RWS 1302 | Rhetoric & Composition 2 | 3 |
| UNIV 1301 | Seminar/Critical Inquiry | 3 |
| **SOPHOMORE** | | |
| **Fall** | | |
| CS 2302 | Data Structures | 3 |
| ECE 2103 | Lab for ECE 2303 | 1 |
| ECE 2303 | Digital Systems Design I | 3 |
| HIST 1302 | History of U.S. Since 1865 | 3 |
| MATH 1312 | Calculus II | 3 |
| Social and Behavioral Sciences * | | 3 |
| **Spring** | | |
| CS 3350 | Automata/Computabi/Formal Lang | 3 |
| PHYS 2320 | Introductory Mechanics | 3 |
| PHYS 2120 | Laboratory for PHYS 2320 | 1 |
| POLS 2310 | Introduction to Politics | 3 |
| Language, Philosophy and Culture * | | 3 |
| Creative Arts * | | 3 |
| **JUNIOR** | | |
| **Fall** | | |
| CS 3331 | Adv. Object-Oriented Programng | 3 |
| CS 3432 | Computer Organization | 4 |
| MATH 3323 | Matrix Algebra | 3 |
| POLS 2311 | American Gover & Politics | 3 |
| Additional Math or Science Lecture | | 3 |
| **Spring** | | |
| CS 3195 | Junior Professionl Orientation | 1 |
| CS 4316 | Computer Networks | 3 |
| CS 4351 | Computer Security | 3 |
| CS 4375 | Operating Systems Concepts | 3 |
| Life and Physical Science Lecture and Lab | | 4 |
| **SENIOR** | | |
| **Fall** | | |
| CS 3360 | Programming Language Concepts | 3 |
| CS 4177 | Software Vulnerabilities | 1 |
| CS 4310 | Software Eng: Requirements Eng | 3 |
| CS 4342 | Database Systems | 3 |
| STAT 3320 | Probability and Statistics | 3 |
| Technical Elective | | 2 |
| **Spring** | | |
| CS 4175 | Parallel Computing | 1 |
| CS 4311 | Software Eng: Design & Implmnt | 3 |

| | | |
|---|---|---|
| CS 4318 | Wireless Networks | 3 |
| CS 4379 | Software Reverse Engineering | 3 |
| Free Elective | | 3 |
| **Notes:** | | |

- Courses that are part of the University Core Curriculum.

• Life and Physical Sciences. In addition to PHYS 2420, students must complete one semester of lecture and associated lab. Acceptable courses are: ASTR 1307 Elem Astronomy-Solar System and ASTR 1107 Astronomy Lab I, PHYS 2421 Introductory Electromagnetism, BIOL 1305 General Biology and BIOL 1107 Topics in Study of Life I, BIOL 1306 Organismal Biology and BIOL 1108 Organismal Biology Laboratory, CHEM 1305 General Chemistry and CHEM 1105 Laboratory for CHEM 1305, CHEM 1306 General Chemistry and CHEM 1106 Laboratory for CHEM 1306, GEOL 1313 Intro to Physical Geology and GEOL 1103 Lab for GEOL 1313, GEOL 1314 Intro to Historical Geology and GEOL 1104 Lab for GEOL 1314. Courses that count towards the core curriculum (2 lectures and a lab associated with one of the 2 lectures) require grade C or better.

• Additional Mathematics or Science Option. Option A: Mathematics: MATH 2313, 2325, 2336, 3320, 3325, 4329, STAT 3381, 4380, 4385 Option B: Science. An additional 3-credit lecture course from the list of Life and Physical Science courses which was not used to satisfy the science lecture/lab requirement.

• Technical Electives: 2 hours from the following: CS 1110 Intro to Problem Solving, CS 1120 Computational Thinking, CS 2210 Algo Thinking in Prob Solv, CS 1190 Special Topics in Computing, CS 1290 Special Topics in Computing, and any CS 3000 or 4000 level courses that are not required upper level CS courses . No more than three credit hours of CS 1XXX and CS 2XXX can count for technical electives. No more than six credit hours of CS 1XXX, CS 2XXX, CS 4181 Undergraduate Seminar, CS 4371 Computer Science Problems, CS 4X73, CS 4392 Rsrch Methods/Computer Science and/or CS 4393 Senior Project (in any combination) can count for technical electives.

• Free Elective. Courses that may be counted towards the free elective requirement are college-level courses (not remedial) offered by the college of Liberal Arts, Business, Science, or Engineering.

| | | |
|---|---|---|
| **Total Hours** | | **120** |

## BS in Computer Science Concentration Software Engineering (Starting with Pre-Calculus)

| Code | Title | Hours |
|---|---|---|
| **BS COMPUTER SCIENCE CONCENTRATION IN SOFTWARE ENGINEERING** | | |
| **(Starting with Pre-Calculus)** | | |
| **Summer** | | |
| MATH 1508 | Precalculus | 3-5 |
| or MATH 1310 | Trigonometry and Conics | |
| **FRESHMAN** | | |
| **Fall** | | |
| CS 1101 | Intro to Computer Science Lab | 1 |
| CS 1301 | Intro to Computer Science | 3 |
| CS 1310 | Intro-Computational Thinking (*) | 3 |
| CS 2101 | Discrete Structures I | 1 |
| MATH 1411 | Calculus I (*) | 4 |
| RWS 1301 | Rhetoric & Composition I (*) | 3 |
| **Spring** | | |
| CS 2202 | Discrete Structures II | 2 |
| CS 2401 | Elem. Data Struct./Algorithms | 4 |
| HIST 1301 | History of U.S. to 1865 | 3 |
| RWS 1302 | Rhetoric & Composition 2 | 3 |
| UNIV 1301 | Seminar/Critical Inquiry | 3 |
| **SOPHOMORE** | | |
| **Fall** | | |
| CS 2302 | Data Structures | 3 |
| ECE 2103 | Lab for ECE 2303 | 1 |
| ECE 2303 | Digital Systems Design I | 3 |
| HIST 1302 | History of U.S. Since 1865 | 3 |
| MATH 1312 | Calculus II | 3 |
| Social and Behavioral Sciences * | | 3 |
| **Spring** | | |

| | | |
|---|---|---|
| CS 3350 | Automata/Computabi/Formal Lang | 3 |
| PHYS 2320 | Introductory Mechanics | 3 |
| PHYS 2120 | Laboratory for PHYS 2320 | 1 |
| POLS 2310 | Introduction to Politics | 3 |
| Creative Arts * | | 3 |
| Language, Philosophy and Culture * | | 3 |
| **JUNIOR** | | |
| **Fall** | | |
| CS 3331 | Adv. Object-Oriented Programng | 3 |
| CS 3432 | Computer Organization | 4 |
| MATH 3323 | Matrix Algebra | 3 |
| POLS 2311 | American Gover & Politics | 3 |
| Additional Math or Science Lecture | | 3 |
| **Spring** | | |
| CS 3195 | Junior Professionl Orientation | 1 |
| CS 4375 | Operating Systems Concepts | 3 |
| Life and Physical Science Lecture and Lab | | 4 |
| Technical Elective | | 3 |
| Technical Elective | | 3 |
| **SENIOR** | | |
| **Fall** | | |
| CS 3360 | Programming Language Concepts | 3 |
| CS 4310 | Software Eng: Requirements Eng | 3 |
| CS 4342 | Database Systems | 3 |
| CS 4374 | Software Construction | 3 |
| STAT 3320 | Probability and Statistics | 3 |
| **Spring** | | |
| CS 4175 | Parallel Computing | 1 |
| CS 4311 | Software Eng: Design & Implmnt | 3 |
| CS 4387 | Software Integration and V&V | 3 |
| Technical Elective | | 3 |
| Free Elective | | 3 |

**Notes:**

- Courses that are part of the University Core Curriculum.

• Life and Physical Sciences. In addition to PHYS 2420, students must complete one semester of lecture and associated lab. Acceptable courses are: ASTR 1307 Elem Astronomy-Solar System and ASTR 1107 Astronomy Lab I, PHYS 2421 Introductory Electromagnetism, BIOL 1305 General Biology and BIOL 1107 Topics in Study of Life I, BIOL 1306 Organismal Biology and BIOL 1108 Organismal Biology Laboratory, CHEM 1305 General Chemistry and CHEM 1105 Laboratory for CHEM 1305, CHEM 1306 General Chemistry and CHEM 1106 Laboratory for CHEM 1306, GEOL 1313 Intro to Physical Geology and GEOL 1103 Lab for GEOL 1313, GEOL 1314 Intro to Historical Geology and GEOL 1104 Lab for GEOL 1314. Courses that count towards the core curriculum (2 lectures and a lab associated with one of the 2 lectures) require grade C or better.

• Additional Mathematics or Science Option. Option A: Mathematics: MATH 2313, 2325, 2336, 3320, 3325, 4329, STAT 3381, 4380, 4385 Option B: Science. An additional 3-credit lecture course from the list of Life and Physical Science courses which was not used to satisfy the science lecture/lab requirement.

• Technical Electives: 3 credit hours from (CS4330, CS4339, CS4371, CS4373, or CS4381). In addition, the student must complete 6 hours from the following: CS 1110 Intro to Problem Solving, CS 1120 Computational Thinking, CS 2210 Algo Thinking in Prob Solv, CS 1190 Special Topics in Computing, CS 1290 Special Topics in Computing, and any CS 3000 or 4000 level courses that are not required upper level CS courses . No more than three credit hours of CS 1XXX and CS 2XXX can count for technical electives. No more than six credit hours of CS 1XXX, CS 2XXX, CS 4181 Undergraduate Seminar, CS 4371 Computer Science Problems, CS 4X73, CS 4392 Rsrch Methods/Computer Science and/or CS 4393 Senior Project (in any combination) can count for technical electives.

• Free Elective. Courses that may be counted towards the free elective requirement are college-level courses (not remedial) offered by the college of Liberal Arts, Business, Science, or Engineering.

| | |
|---|---|
| **Total Hours** | **123-125** |

## BS in Computer Science Concentration Software Engineering (Starting with Calculus)

| Code | Title | Hours |
|---|---|---|
| **BS COMPUTER SCIENCE CONCENTRATION IN SOFTWARE ENGINEERING** | | |
| **FRESHMAN** | | |
| **Fall** | | |
| CS 1101 | Intro to Computer Science Lab | 1 |
| CS 1301 | Intro to Computer Science | 3 |
| CS 1310 | Intro-Computational Thinking (*) | 3 |
| CS 2101 | Discrete Structures I | 1 |
| MATH 1411 | Calculus I (*) | 4 |
| RWS 1301 | Rhetoric & Composition I (*) | 3 |
| **Spring** | | |
| CS 2202 | Discrete Structures II | 2 |
| CS 2401 | Elem. Data Struct./Algorithms | 4 |
| HIST 1301 | History of U.S. to 1865 | 3 |
| RWS 1302 | Rhetoric & Composition 2 | 3 |
| UNIV 1301 | Seminar/Critical Inquiry | 3 |
| **SOPHOMORE** | | |
| **Fall** | | |
| CS 2302 | Data Structures | 3 |
| ECE 2103 | Lab for ECE 2303 | 1 |
| ECE 2303 | Digital Systems Design I | 3 |
| HIST 1302 | History of U.S. Since 1865 | 3 |
| MATH 1312 | Calculus II | 3 |
| Social and Behavioral Sciences * | | 3 |
| **Spring** | | |
| CS 3350 | Automata/Computabi/Formal Lang | 3 |
| PHYS 2320 | Introductory Mechanics | 3 |
| PHYS 2120 | Laboratory for PHYS 2320 | 1 |
| POLS 2310 | Introduction to Politics | 3 |
| Creative Arts * | | 3 |
| Language, Philosophy and Culture * | | 3 |
| **JUNIOR** | | |
| **Fall** | | |
| CS 3331 | Adv. Object-Oriented Programng | 3 |
| CS 3432 | Computer Organization | 4 |
| MATH 3323 | Matrix Algebra | 3 |
| POLS 2311 | American Gover & Politics | 3 |
| Additional Math or Science Lecture | | 3 |
| **Spring** | | |
| CS 3195 | Junior Professionl Orientation | 1 |
| CS 4375 | Operating Systems Concepts | 3 |
| Life and Physical Science Lecture and Lab | | 4 |
| Technical Elective | | 3 |
| Technical Elective | | 3 |
| **SENIOR** | | |
| **Fall** | | |
| CS 3360 | Programming Language Concepts | 3 |
| CS 4310 | Software Eng: Requirements Eng | 3 |
| CS 4342 | Database Systems | 3 |
| CS 4374 | Software Construction | 3 |
| STAT 3320 | Probability and Statistics | 3 |

| | | |
|---|---|---|
| **Spring** | | |
| CS 4175 | Parallel Computing | 1 |
| CS 4311 | Software Eng: Design & Implmnt | 3 |
| CS 4387 | Software Integration and V&V | 3 |
| Technical Elective | | 3 |
| Free Elective | | 3 |

**Notes:**

- Courses that are part of the University Core Curriculum.

• Life and Physical Sciences. In addition to PHYS 2420, students must complete one semester of lecture and associated lab. Acceptable courses are: ASTR 1307 Elem Astronomy-Solar System and ASTR 1107 Astronomy Lab I, PHYS 2421 Introductory Electromagnetism, BIOL 1305 General Biology and BIOL 1107 Topics in Study of Life I, BIOL 1306 Organismal Biology and BIOL 1108 Organismal Biology Laboratory, CHEM 1305 General Chemistry and CHEM 1105 Laboratory for CHEM 1305, CHEM 1306 General Chemistry and CHEM 1106 Laboratory for CHEM 1306, GEOL 1313 Intro to Physical Geology and GEOL 1103 Lab for GEOL 1313, GEOL 1314 Intro to Historical Geology and GEOL 1104 Lab for GEOL 1314. Courses that count towards the core curriculum (2 lectures and a lab associated with one of the 2 lectures) require grade C or better.

• Additional Mathematics or Science Option. Option A: Mathematics: MATH 2313, 2325, 2336, 3320, 3325, 4329, STAT 3381, 4380, 4385 Option B: Science. An additional 3-credit lecture course from the list of Life and Physical Science courses which was not used to satisfy the science lecture/lab requirement.

• Technical Electives: 3 credit hours from (CS4330, CS4339, CS4371, CS4373, or CS4381). In addition, the student must complete 6 hours from the following: CS 1110 Intro to Problem Solving, CS 1120 Computational Thinking, CS 2210 Algo Thinking in Prob Solv, CS 1190 Special Topics in Computing, CS 1290 Special Topics in Computing, and any CS 3000 or 4000 level courses that are not required upper level CS courses . No more than three credit hours of CS 1XXX and CS 2XXX can count for technical electives. No more than six credit hours of CS 1XXX, CS 2XXX, CS 4181 Undergraduate Seminar, CS 4371 Computer Science Problems, CS 4X73, CS 4392 Rsrch Methods/Computer Science and/or CS 4393 Senior Project (in any combination) can count for technical electives.

• Free Elective. Courses that may be counted towards the free elective requirement are college-level courses (not remedial) offered by the college of Liberal Arts, Business, Science, or Engineering.

| | |
|---|---|
| **Total Hours** | **120** |