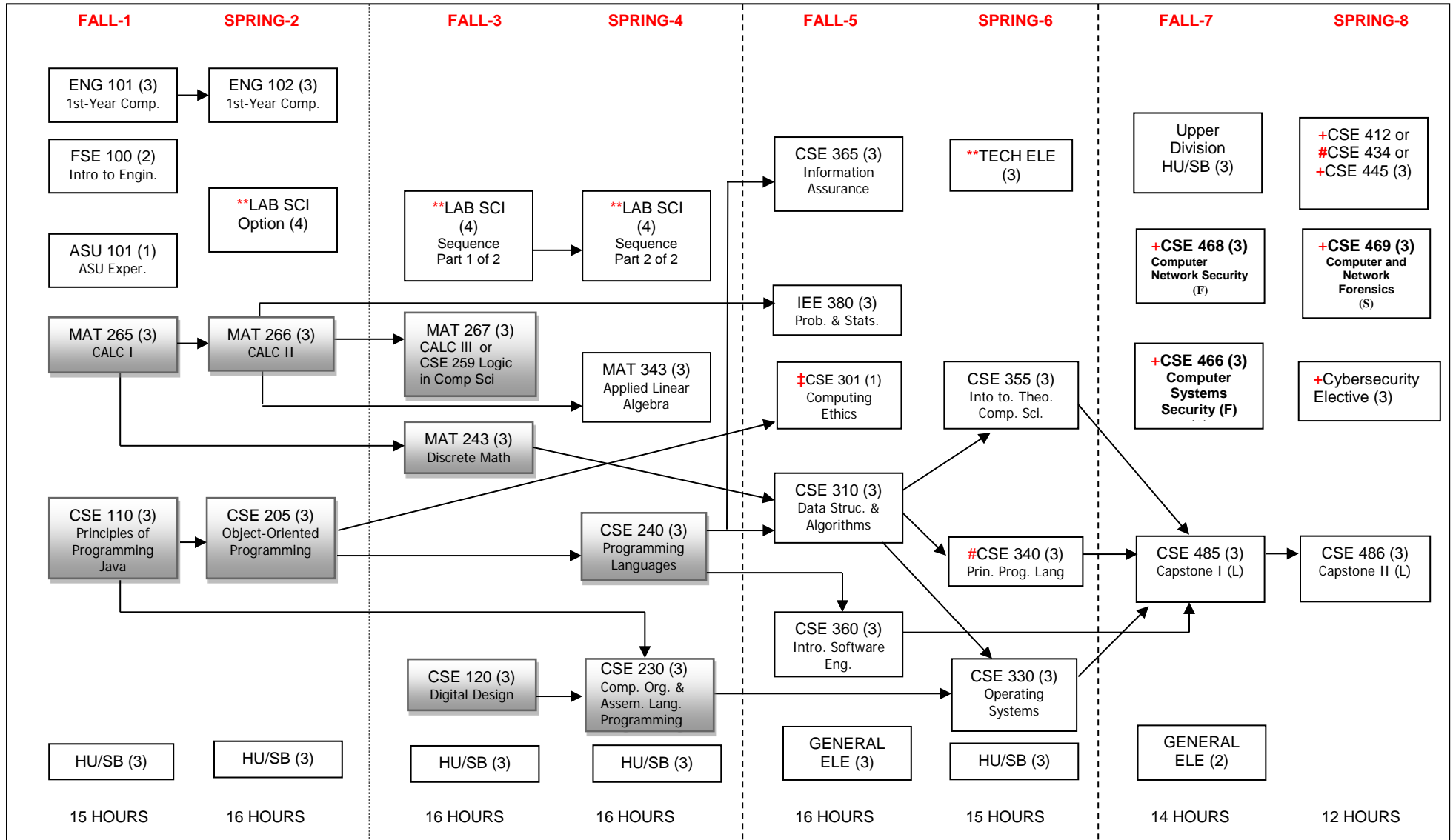


**Computer Science (Cybersecurity Concentration), BS**  
**Bachelor of Science, 2019-2020 Catalog Year**  
 ESCSEIBS



Notes: \*\* See CIDSE Advising Center or CIDSE Website (<http://cidse.engineering.asu.edu/degreerequirementsbscs/>) for approved technical electives and approved lab science sequence courses.

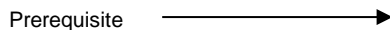
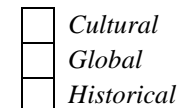
‡ CSE 301 requires FSE 100 as an additional prerequisite

# CSE 340 and CSE 434 require CSE 230 as an additional prerequisite

+ Cybersecurity Concentration and other CSE 4XX courses require CSE 310 and/or CSE 360 as a prerequisite.

Shaded courses designate critical requirements. Minimum 'C' grade required in all CSE major courses.

**Boxed courses are offered in specific terms only**



### Term 1

**CSE 110: Principles of Programming with Java** -Concepts of problem solving using Java, algorithm design, structured programming, fundamental algorithms and techniques, and computer systems concepts. Social and ethical responsibility.

**FSE 100: Introduction to Engineering**-Introduces the engineering design process; working in engineering teams; the profession of engineering; engineering models, written and oral technical communication skills.

**MAT 265: Calculus for Engineers I**-Limits and continuity, differential calculus of functions of one variable, introduction to integration. Not open to students with credit in MAT 270.

**ASU 101-CSE: The ASU Experience**

**ENG 101: First-Year Composition**

**HU/SB:** Humanities, Fine Arts & Design or Social & Behavioral Sciences

### Term 2

**CSE 205: Object-Oriented Programming & Data Structures**-Problem solving by programming with an object-oriented programming language. Introduces data structures. Overview of computer science topics.

**MAT 266: Calculus for Engineers II** -Methods of integration, applications of calculus, elements of analytic geometry, improper integrals, Taylor series

**ENG 102: First-Year Composition**

**Lab Science Option:** choose from BIO 181, GLG 101 & 103, GLG 110 & 111, CHM 113 or 114, OR PHY 121 & 122

**HU/SB:** Humanities, Fine Arts & Design or Social & Behavioral Sciences

### Term 3

**CSE 120: Digital Design Fundamentals**-Number systems, conversion methods, binary and complement arithmetic, Boolean algebra, circuit minimization, ROMs, PLAs, flipflops, synchronous sequential circuits

**MAT 243: Discrete Mathematical Structures**-Logic, sets, functions, elementary number theory and combinatorics, recursive algorithms, and mathematical reasoning, including induction. Emphasizes connections to computer science.

**MAT 267: Calculus for Engineers III** -Vector-valued functions of several variables, partial derivatives, multiple integration **OR**

**CSE 259: Logic in Computer Science** - This course is a mathematically solid introduction to propositional logic, first order logic, logic programming, and their applications in computer science.

**Lab Science:** PHY 121/122 & PHY 131/132 or CHM113 & 116 or GLG 101/103 & GLG 102/104 or BIO 181 & 182

**HU/SB:** Humanities, Fine Arts & Design or Social & Behavioral Sciences

### Term 4

**CSE 230: Computer Organization & Assembly Language Programming**-Register-level computer organization. Instruction set architecture. Assembly language. Processor organization and design. Memory organization. IO programming, Exception/interrupt handling.

**CSE 240: Introduction to Programming Languages** -Introduces the procedural (C/C++), applicative (LISP/Scheme), and declarative (Prolog) languages.

**MAT 343: Applied Linear Algebra**-Solving linear systems, matrices, determinants, vector spaces, bases, linear transformations, eigenvectors, norms, inner products, decompositions, applications. Problem solving using MATLAB.

**Lab Science:** complete sequence from above

**HU/SB:** Humanities, Fine Arts & Design or Social & Behavioral Sciences

### Term 5

**CSE 301: Computing Ethics**-Ethics for computing majors: history of computing, intellectual property, privacy, ethical frameworks, professional ethical responsibilities, and risks of computer-based systems.

**CSE 310: Data Structures and Algorithms**-Advanced data structures and algorithms, including stacks, queues, trees (B, B+, AVL), and graphs. Searching for graphs, hashing, external sorting.

**CSE 360: Introduction to Software Engineering**-Software life cycle models; project management, team development environments and methodologies; software architectures; quality assurance and standards; legal, ethical issues

**IA Core - CSE 365: Information Assurance**-Concepts of information assurance (IA); basic IA techniques, policies, risk management, administration, legal and ethics issues.

**IEE 380: Probability and Statistics for Engineering Problem Solving**-Applications-oriented course with computer-based experience using statistical software for formulating and solving engineering problems

**General Elective**

### Term 6

**CSE 330: Operating Systems**-Operating system structure and services, processor scheduling, concurrent processes, synchronization techniques, memory management, virtual memory, input/output, storage management, and file systems.

**CSE 340: Principles of Programming Languages**-Formal syntactic and semantic descriptions, compilation and implementation issues, and theoretical foundations for several programming paradigms.

**CSE 355: Introduction to Theoretical Computer Science**-Introduces formal language theory and automata, Turing machines, decidability/undecidability, recursive function theory, and complexity theory.

**Technical Elective:** Upper Division Technical Elective from list on DARS/major map

**HU/SB:** Humanities, Fine Arts & Design or Social & Behavioral Sciences

### Term 7

**CSE 485: Computer Science Capstone Project I**-First course in capstone sequence for computer science majors emphasizing development process, technical skills, teamwork, and communication.

**CSE 466: Computer Systems Security** - Countermeasures to attacks to computer systems from miscreants (or hackers) and basic topics of cryptography and network security.

**CSE 468: Computer Network Security** - Practical network security exposure and hands-on experience about basic concepts, case studies, and useful tools.

**HU/SB: Upper Division** Humanities, Fine Arts & Design or Social & Behavioral Sciences

**General Elective (2 credits)**

### Term 8

**CSE 486: Computer Science Capstone Project II**-Second course in capstone sequence for computer science majors continuing the development process, technical skills, teamwork, and communication.

**CSE 469: Computer and Network Forensics** - Identification, extraction, documentation, interpretation, and preservation of computer media for evidentiary purposes, file system forensics, and network forensics.

**Cybersecurity Elective** (choose from CSE 460, CSE 463 or CSE 471)

**CSE 412 Database Management** (Introduces DBMS concepts. Data models and languages.

Relational database theory. Database security/integrity and concurrency) **OR CSE 434**

**Computer Networks** (Network architecture and protocols, principles of network applications, socket programming, flow and congestion control, switching and routing, link-layer technologies, traffic capture and analysis, security) **OR CSE 445 Distributed Software Development** (Distributed system architectures and design, service-oriented computing, and frameworks for development of distributed applications and software components)