

## **NOTICE OF COURSE UPDATES**

The below course updates were enacted after the 2019-20 catalog was published.

The course updates apply to ALL students taking an updated course in or after the effective semester regardless of a student's official catalog year.

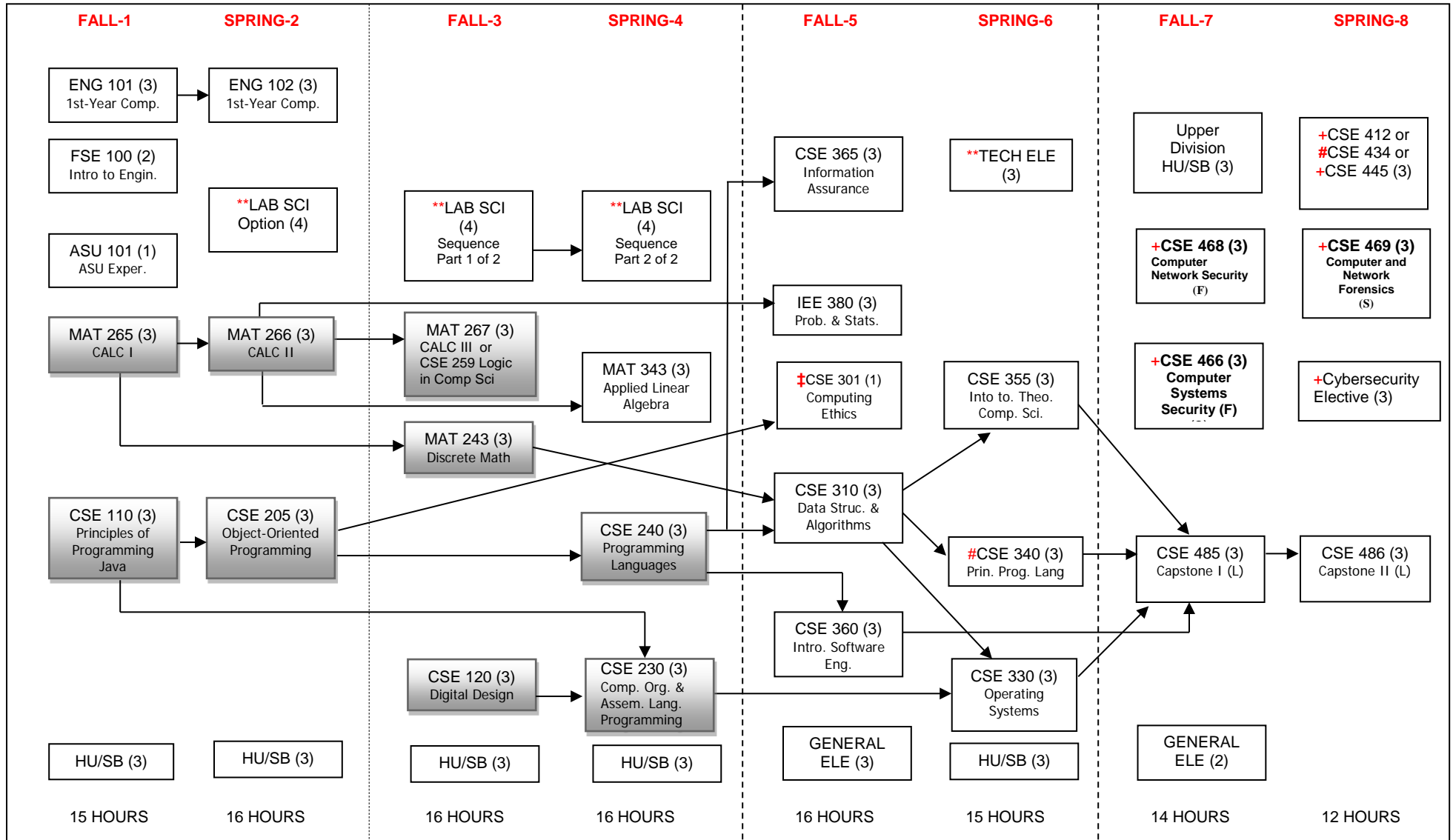
The course updates may add necessary prerequisites which are not reflected in the flowchart ordering.

If you have any questions about the course updates and how they may impact your specific graduation plan please speak with your SCAI academic advisor.

<b>Course</b>	<b>Change</b>	<b>Effective Semester</b>
CSE 466	CSE 365 Added to Prerequisites	Fall 2020
CSE 467	CSE 365 Added to Prerequisites	Fall 2020
CSE 485	CSE 301 Added to Prerequisites	Fall 2021

**CONTINUE TO  
COMPUTER SCIENCE (CYBERSECURITY) FLOWCHART**

**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.

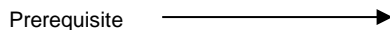
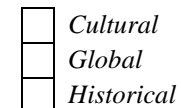
† CSE 301 requires FSE 100 as an additional prerequisite

# 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.

**Bolded 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)