## 2022 - 2023 Major Map
### Computer Science (Cybersecurity), BS

**School/College:** Ira A. Fulton Schools of Engineering  
**Location:** Tempe  
**ESCSEIBS**

### Term 1  0 - 15 Credit Hours

<table>
<thead>
<tr>
<th>Critical course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
</table>
| CSE 110: Principles of Programming (CS) | 3 | C | • ASU 101 or college-specific equivalent First-Year Seminar required of all first-year students and should be taken in the first semester.  
• If ENG 105 is taken, a 3 credit hour elective must also be taken prior to graduation.  
• Prep for success using the First-Year Student Guide.  
• Join a Fulton community.  
• Explore engineering and technical professions. |
| ASU 101-CSE: The ASU Experience | 1 | | |
| ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition | 3 | C | |
| FSE 100: Introduction to Engineering | 2 | C | |
| MAT 265: Calculus for Engineers I (MA) | 3 | C | |
| Social-Behavioral Sciences (SB) AND Global Awareness (G) | 3 | | |
| Complete Mathematics (MA) requirement. | | | |
| Minimum 2.00 GPA ASU Cumulative. | | | |

**Term hours subtotal:** 15

### Term 2  15 - 31 Credit Hours

<table>
<thead>
<tr>
<th>Critical course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
</table>
| CSE 205: Object-Oriented Programming and Data Structures (CS) | 3 | C | • Three total (SQ) lab science courses are required. Two (SQ) courses must be from the same subject area and one (SQ) course must be from a different subject area.  
• Create a Handshake profile.  
• Get involved with EPICS, the Generator Labs, and the Fulton Start-Up Center. |
| ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition | 3 | C | |
| Humanities, Arts and Design (HU) AND Cultural Diversity in the U.S. (C) | 3 | | |
| Natural Science - Quantitative (SQ) | 4 | | |
| Complete ENG 101 OR ENG 105 OR ENG 107 course(s). | | | |
| Complete MAT 170 OR MAT 171 OR MAT 265 OR MAT 270 course(s). | | | |
| Minimum 2.00 GPA ASU Cumulative. | | | |

**Term hours subtotal:** 16

### Term 3  31 - 47 Credit Hours

<table>
<thead>
<tr>
<th>Critical course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
</table>
| CSE 120: Digital Design Fundamentals | 3 | C | • Three total (SQ) lab science courses are required. Two (SQ) courses must be from the same subject area and one (SQ) course must be from a different subject area.  
• Prep for success using the Sophomore Guide. |
| CSE 240: Introduction to Programming Languages | 3 | C | |
| MAT 243: Discrete Mathematical Structures | 3 | C | |
| MAT 267: Calculus for Engineers III (MA) OR CSE 259: Logic in Computer Science | 3 | C | |
| Natural Science - Quantitative (SQ) | 4 | | |
Complete MAT 266 OR MAT 271 course(s).

Complete First-Year Composition requirement.

Minimum 2.00 GPA ASU Cumulative.

Complete Mathematics (MA) requirement.

<table>
<thead>
<tr>
<th>Term 4 47 - 63 Credit Hours</th>
<th>Critical course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 230: Computer Organization and Assembly Language Programming</td>
<td>3</td>
<td>C</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CSE 310: Data Structures and Algorithms</td>
<td>3</td>
<td>C</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Natural Science - Quantitative (SQ)</td>
<td>4</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Complete 2 courses:</td>
<td></td>
<td>6</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Elective</td>
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Minimum 2.00 GPA ASU Cumulative.

<table>
<thead>
<tr>
<th>Term 5 63 - 79 Credit Hours</th>
<th>Necessary course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>IEE 380: Probability and Statistics for Engineering Problem Solving (CS)</td>
<td>3</td>
<td>C</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CSE 301: Computing Ethics</td>
<td>1</td>
<td>C</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CSE 355: Introduction to Theoretical Computer Science</td>
<td>3</td>
<td>C</td>
<td>-</td>
<td></td>
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<tr>
<td>CSE 360: Introduction to Software Engineering</td>
<td>3</td>
<td>C</td>
<td>-</td>
<td></td>
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<tr>
<td>CSE 365: Information Assurance</td>
<td>3</td>
<td>C</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Social-Behavioral Sciences (SB) AND Historical Awareness (H)</td>
<td>3</td>
<td>-</td>
<td>-</td>
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Term hours subtotal: 16

<table>
<thead>
<tr>
<th>Term 6 79 - 94 Credit Hours</th>
<th>Necessary course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 330: Operating Systems</td>
<td>3</td>
<td>C</td>
<td>-</td>
<td></td>
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<tr>
<td>CSE 340: Principles of Programming Languages</td>
<td>3</td>
<td>C</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>CSE 412: Database Management OR CSE 434: Computer Networks OR CSE 445: Distributed Software Development</td>
<td>3</td>
<td>C</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>MAT 343: Applied Linear Algebra</td>
<td>3</td>
<td>C</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Humanities, Arts and Design (HU)</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Complete Cultural Diversity in the U.S. (C) AND Global Awareness (G) AND Historical Awareness (H) course(s).</td>
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Term hours subtotal: 15

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<tr>
<th>Term 7 94 - 108 Credit Hours</th>
<th>Necessary course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 485: Computer Science Capstone Project I (L)</td>
<td>3</td>
<td>C</td>
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</tr>
<tr>
<td>Upper Division Cybersecurity Elective</td>
<td>3</td>
<td>C</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Upper Division Cybersecurity Focus Courses</td>
<td>3</td>
<td>C</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Upper Division Humanities, Arts and Design (HU) OR Upper Division Social-Behavioral Sciences (SB)</td>
<td>3</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>2</td>
<td>-</td>
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</tbody>
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Term hours subtotal: 14
Cybersecurity Focus Courses

- CSE 466: Computer Systems Security
- CSE 468: Computer Network Security (CSE 468 requires CSE 434 as a prerequisite)
- CSE 469: Computer and Network Forensics
- CSE 494: Artificial Intelligence for Cyber Security

Cybersecurity Electives

- CSE 445: Distributed Software Development
- CSE 460: Software Analysis and Design
- CSE 463: Introduction to Human Computer Interaction
- CSE 464: Software Quality Assurance and Testing
- CSE 466: Computer Systems Security
- CSE 468: Computer Network Security
- CSE 469: Computer and Network Forensics
- CSE 471: Introduction to Artificial Intelligence
- CSE 494: Artificial Intelligence for Cyber Security

Technical Electives

- AEE 415: Vibration Analysis
- AEE 426: Design of Aerospace Structures
- AEE 462: Space Vehicle Dynamics and Control
- AEE 463: Aircraft Propulsion
- AEE 465: Rocket Propulsion
- AEE 468: Aircraft Systems Design
- AEE 471: Computational Fluid Dynamics
- AME 430: Mac Development for Media Arts
- AME 435: Mobile Development
- BCH 361: Advanced Principles of Biochemistry
- BCH 461: General Biochemistry
- BCH 462: General Biochemistry
- BIO 340: General Genetics
- BIO 343: Genetic Engineering and Society (L)
- BIO 345: Evolution
- BME 350: Signals and Systems for Bioengineers
- BME 413: Biomedical Instrumentation (L)
- BME 416: Advanced Biomechanics
- BME 494: Applied Computational Behavioral Science
- CEE 412: Pavement Analysis and Design
- CEE 432: Developing Software for Engineering Applications
- CEE 440: Hydrology

Term 8 108 - 120 Credit Hours Necessary course signified by ★

<table>
<thead>
<tr>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>3</td>
<td>C</td>
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<tr>
<td>3</td>
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<tr>
<td>3</td>
<td>C</td>
<td></td>
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<td></td>
<td></td>
<td>• Please see course lists below for Technical Electives. Contact CIDSE Advising or visit the CIDSE website for additional information.</td>
</tr>
</tbody>
</table>

• Technical Electives may require additional prerequisites.
• For additional information on major curriculum, please visit the Computer Science Degree Requirements website and the Concentration Requirements website.

Hide Course List(s)/Track Group(s)
CEE 441: Water Resources Engineering
CEE 452: Foundations
CEE 462: Unit Operations in Environmental Engineering
CEE 466: Urban Water System Design
CEE 467: Environmental Microbiology
CEE 474: Transportation Systems Planning
CEE 475: Highway Geometric Design
CEE 481: Civil Engineering Project Management
CEE 483: Highway Materials, Construction, and Quality
CEE 486: Integrated Civil Engineering Design (L)
CHE 342: Introduction to Applied Chemical Thermodynamics
CHE 432: Principles of Chemical Engineering Design
CHE 442: Introduction to Chemical Reactor Design
CHE 461: Process Dynamic Control (CS)
CHE 462: Process Design (L)
CHE 469: Air Quality Engineering
CHE 475: Biochemical Engineering
CIS 415: Big Data Analytics in Business
CPI 311: Game Engine Development
CPI 350: Evaluation of Informatics Systems
CPI 360: Decision Making and Problem Solving
CPI 411: Graphics for Games
CPI 460: Intelligent Interactive Instructional Systems
CPI 462: Design for Learning in Virtual Worlds
CSE 320: Design and Synthesis of Digital Hardware
CSE 325: Embedded Microprocessor Systems
CSE 335: Principles of Mobile Application Development
CSE 4** Elective
DAT 300: Mathematical Tools for Data Science
DAT 301: Exploring Data in R and Python
### Technical Electives continued

- **EEE 360**: Energy Systems and Power Electronics
- **EEE 404**: Real-Time DSP Systems
- **EEE 407**: Digital Signal Processing
- **EEE 425**: Digital Systems and Circuits
- **EEE 433**: Analog Integrated Circuits
- **EEE 434**: Quantum Mechanics for Engineers
- **EEE 435**: Fundamentals of CMOS and MEMS
- **EEE 436**: Fundamentals of Solid-State Devices
- **EEE 437**: Optoelectronics
- **EEE 439**: Semiconductor Facilities and Cleanroom Practices
- **EEE 443**: Antennas for Wireless Communications
- **EEE 445**: Microwaves
- **EEE 448**: Fiber Optics
- **EEE 455**: Communication Systems
- **EEE 459**: Communication Networks
- **EEE 460**: Nuclear Power Engineering
- **EEE 463**: Electrical Power Plants
- **EEE 470**: Electric Power Devices
- **EEE 471**: Power System Analysis
- **EEE 473**: Electrical Machinery
- **EEE 480**: Feedback Systems
- **EEE 481**: Computer-Controlled Systems
- **FSE 301**: Entrepreneurship and Value Creation
- **FSE 394**: Engineering for Humanity
- **FSE 404**: EPICS Gold: EPICS in Action
IEE 376: Operations Research Deterministic Techniques/Applications
IEE 381: Lean Six Sigma Methodology
IEE 385: Engineering Statistics: Probability
IEE 412: Introduction to Financial Engineering
IEE 426: Operations Research in Healthcare
IEE 431: Engineering Administration (L)
IEE 456: Introduction to Systems Engineering
IEE 458: Project Management
IEE 461: Production Control
IEE 470: Stochastic Operations Research
IEE 474: Quality Control
IEE 475: Simulating Stochastic Systems (CS)
MAE 341: Mechanism Analysis and Design
MAE 404: Finite Elements in Engineering
MAE 417: System Dynamics and Control II
MAE 436: Combustion
MAE 455: Polymers and Composites
MAT Upper Division Elective
 Except for: MAT 300, MAT 340, MAT 342, MAT 343 and MAT 485
MSE 335: Materials Kinetics
MEE 351: Manufacturing Processes
MEE 434: Internal Combustion Engines
MEE 446: Energy Systems Design II
MSE 415: Mathematical and Computer Methods in Materials (CS)
PHY 302: Mathematical Methods in Physics II
PHY 361: Introductory Modern Physics
PHY 462: Particle and Nuclear Physics
SER 421: Web-Based Applications
SER 422: Web Application Programming
SER 423: Mobile Systems
STP 421: Probability
STP 425: Stochastic Processes
STP 427: Mathematical Statistics
STP 429: Applied Regression (CS)
Notes:

- First-Year Composition: All students are placed in ENG 101 unless submission of SAT, ACT, Accuplacer, IELTS, or TOEFL score, or college-level transfer credit or test credit equivalent to ASU's first-year composition course(s), determine otherwise. Students on Polytechnic, Downtown Phoenix and West Campuses are encouraged to complete the Directed Self-Placement survey to choose the first-year composition option they believe best suits their needs. Visit: https://cisa.asu.edu/DSP
- Mathematics Placement Assessment score determines placement in first mathematics course.

Total Hours: 120
Upper Division Hours: 45 minimum
Major GPA: 2.00 minimum
Cumulative GPA: 2.00 minimum
Total hrs at ASU: 30 minimum
Hrs Resident Credit for Academic Recognition: 56 minimum
Total Community College Hrs: 64 maximum

General University Requirements Legend

General Studies Core Requirements:
- Literacy and Critical Inquiry (L)
- Mathematical Studies (MA)
- Computer/Statistics/Quantitative Applications (CS)
- Humanities, Arts and Design (HU)
- Social-Behavioral Sciences (SB)
- Natural Science - Quantitative (SQ)
- Natural Science - General (SG)

General Studies Awareness Requirements:
- Cultural Diversity in the U.S. (C)
- Global Awareness (G)
- Historical Awareness (H)

First-Year Composition

General Studies designations listed on the major map are current for the 2022 - 2023 academic year.