## 2019 - 2020 Major Map

### Computer Science, BS

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

### Term 1 - 0 - 15 Credit Hours

<table>
<thead>
<tr>
<th>Critical course signified by</th>
<th>Hours</th>
<th>Minimum Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 110: Principles of Programming with Java (CS)</td>
<td>3</td>
<td>C</td>
</tr>
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<td>MAT 265: Calculus for Engineers I (MA)</td>
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<tr>
<td>ASU 101-CSE: The ASU Experience</td>
<td>1</td>
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</tr>
<tr>
<td>ENG 101 or ENG 102: First-Year Composition OR ENG 105: Advanced First-Year Composition OR ENG 107 or ENG 108: First-Year Composition</td>
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</tr>
<tr>
<td>FSE 100: Introduction to Engineering</td>
<td>2</td>
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<tr>
<td>Social-Behavioral Sciences (SB) AND Global Awareness (G)</td>
<td>3</td>
<td></td>
</tr>
</tbody>
</table>

Minimum 2.00 GPA ASU Cumulative.

Term hours subtotal: **15**

### Term 2 - 15 - 31 Credit Hours

<table>
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<tr>
<th>Critical course signified by</th>
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<tbody>
<tr>
<td>CSE 205: Object-Oriented Programming and Data Structures (CS)</td>
<td>3</td>
<td>C</td>
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<td>MAT 266: Calculus for Engineers II (MA)</td>
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<td>Humanities, Arts and Design (HU) AND Cultural Diversity in the U.S. (C)</td>
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<td></td>
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Minimum 2.00 GPA ASU Cumulative.

Term hours subtotal: **16**

### Term 3 - 31 - 47 Credit Hours

<table>
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<tr>
<td>CSE 120: Digital Design Fundamentals</td>
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<td>MAT 243: Discrete Mathematical Structures</td>
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<td>C</td>
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<td>MAT 267: Calculus for Engineers III (MA) OR CSE 259: Logic in Computer Science</td>
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Minimum 2.00 GPA ASU Cumulative.

Complete Mathematics (MA) requirement.

- An SAT, ACT, Accuplacer, TOEFL or IELTS score determines placement into first-year composition courses.
- Mathematics Placement Assessment score determines placement in mathematics course.
- ASU 101 or College specific equivalent First Year Seminar required of all freshman students and should be taken in the first semester.
- If ENG 105 is taken, a three (3) semester hour elective must also be taken prior to graduation.
- Prep for success using the Freshman Guide.
- Join a Fulton community.
- Explore engineering and technical professions.

### Term 1 - 0 - 15 Credit Hours

**Critical course signified by** | Hours | Minimum Grade | Notes |
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Minimum 2.00 GPA ASU Cumulative.

Term hours subtotal: **15**

### Term 2 - 15 - 31 Credit Hours

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Minimum 2.00 GPA ASU Cumulative.

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### Term 3 - 31 - 47 Credit Hours

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Minimum 2.00 GPA ASU Cumulative.

Complete Mathematics (MA) requirement.

- Three (3) lab science classes are required. Two of the 3 classes must be from the same subject area or discipline.
- Create a Handshake profile.
- Get involved with EPICS, the Generator Labs, and the Fulton Start-Up Center.
- Prep for success using the Sophomore Guide.
- Consult the Resume, Presentation, and Resource Library for tips on how to create a technical resume, job shadow, do informational interviews and mentor with alumni.
### Term 4

<table>
<thead>
<tr>
<th>Course Description</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 230: Comp. Org. and Assembly Language Programming</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>CSE 240: Intro to Programming Languages</td>
<td>3</td>
<td>C</td>
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<tr>
<td>MAT 343: Applied Linear Algebra</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Humanities, Arts and Design (HU)</td>
<td>3</td>
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Minimum 2.00 GPA ASU Cumulative.

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<th>Course Description</th>
<th>Hours</th>
<th>Minimum Grade</th>
<th>Notes</th>
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</thead>
<tbody>
<tr>
<td>CSE 310: Data Structures and Algorithms</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>CSE 301: Computing Ethics</td>
<td>1</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>CSE 360: Intro to Software Engineering</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>CSE 365: Information Assurance</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>IEE 380: Probability and Statistics for Engineering Problem Solving (CS)</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
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</tbody>
</table>

Term hours subtotal: 16

### Term 6

<table>
<thead>
<tr>
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<th>Minimum Grade</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSE 340: Principles of Programming Languages</td>
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<td></td>
</tr>
<tr>
<td>CSE 330: Operating Systems</td>
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<td>C</td>
<td></td>
</tr>
<tr>
<td>CSE 355: Intro to Theoretical Computer Science</td>
<td>3</td>
<td>C</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>
</tr>
<tr>
<td>Upper Division Humanities, Arts and Design (HU) OR Upper Division Social-Behavioral Sciences (SB)</td>
<td>3</td>
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</tbody>
</table>

Complete Cultural Diversity in the U.S. (C) AND Global Awareness (G) AND Historical Awareness (H) course(s).

Term hours subtotal: 15

### Term 7

<table>
<thead>
<tr>
<th>Course Description</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>
<td></td>
</tr>
<tr>
<td>Complete 2 courses: CSE 4** Elective</td>
<td>6</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Upper Division Technical Elective</td>
<td>3</td>
<td>C</td>
<td></td>
</tr>
<tr>
<td>Elective</td>
<td>2</td>
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Term hours subtotal: 14

### Term 8

<table>
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<tr>
<th>Course Description</th>
<th>Hours</th>
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<th>Notes</th>
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<tbody>
<tr>
<td>Please see course lists below for Technical Electives. Contact CIDSE Advising or visit the CIDSE website for additional information.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Plan for success using the Senior Guide.</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Use Handshake to apply for full-time positions.</td>
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<tr>
<td>Complete an in-person or virtual practice interview.</td>
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<td></td>
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</table>

Term hours subtotal: 14
CSE 486: Computer Science Capstone Project II (L) | 3 | C

Complete 2 courses:

<table>
<thead>
<tr>
<th>Course</th>
<th>Credits</th>
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<tbody>
<tr>
<td>CSE 4** Elective</td>
<td>6</td>
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<tr>
<td>Upper Division Technical Elective</td>
<td>3</td>
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</table>

Term hours subtotal: 12

- Please see course lists below for Technical Electives. Contact CIDSE Advising or visit the CIDSE website for additional information.

Hide Course List(s)/Track Group(s)

Lab Science Requirement

- BIO 181: General Biology I (SQ)
- BIO 182: General Biology II (SG)
- CHM 113: General Chemistry I (SQ)
- CHM 116: General Chemistry II (SQ)
- GLG 101: Introduction to Geology I (Physical) (SQ) AND GLG 103: Introduction to Geology I-Laboratory (SQ)
- GLG 102: Introduction to Geology II (Historical) (SG & H) AND GLG 104: Introduction to Geology II-Laboratory (SG)
- GLG 110: Dangerous World (SG & G) AND GLG 111: Dangerous World Laboratory (SG)
- PHY 121: University Physics I: Mechanics (SQ) AND PHY 122: University Physics Laboratory I (SQ)
- PHY 131: University Physics II: Electricity and Magnetism (SQ) AND PHY 132: University Physics Laboratory II (SQ)

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
- 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
- CEE 412: Pavement Analysis and Design
- CEE 432: Developing Software for Engineering Applications
- CEE 440: Hydrology
- CEE 441: Water Resources Engineering
- CEE 452: Foundations
- CEE 462: Unit Operations in Environmental Engineering

Technical Electives continued

- EEE 304: Signals and Systems II
- EEE 333: Hardware Design Languages and Programmable Logic
- EEE 350: Random Signal Analysis
- 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

CSE 486: Computer Science Capstone Project II (L) | 3 | C

Complete 2 courses:

<table>
<thead>
<tr>
<th>Course</th>
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<td>CSE 4** Elective</td>
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Term hours subtotal: 12

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- AEE 426: Design of Aerospace Structures
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- AEE 465: Rocket Propulsion
- AEE 468: Aircraft Systems Design
- AEE 471: Computational Fluid Dynamics
- AME 430: Mac Development for Media Arts
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- BCH 461: General Biochemistry
- BCH 462: General Biochemistry
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- BIO 343: Genetic Engineering and Society (L)
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- 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
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- EEE 473: Electrical Machinery
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 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 325: Embedded Microprocessor Systems
CSE 335: Principles of Mobile Application Development
CSE 4** Elective

EEE 480: Feedback Systems
EEE 481: Computer-Controlled Systems
FSE 301: Entrepreneurship and Value Creation

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

MEE 434: Internal Combustion Engines
MEE 446: Energy Systems Design

PHY 302: Mathematical Methods in Physics II
PHY 361: Introductory Modern Physics
PHY 462: Particle and Nuclear Physics
PHY 494: Computational Methods in Physics

SER 421: Web-Based Applications and Mobile Systems
SER 422: Web Application Programming
SER 423: Mobile Systems

STP 421: Probability
General Studies designations listed on the major map are current for the 2019 - 2020 academic year.

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 2019 - 2020 academic year.

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

STP 425: Stochastic Processes

STP 427: Mathematical Statistics

STP 429: Experimental Statistics (CS)

NOTE: Maximum 3 hours CSE 484 or FSE 301. Maximum 6 hours of CSE 484, 492, 493 or 499. Some Technical Electives may require additional prerequisites.