## Requirements for Bachelor of Science in Software Engineering* (updated: 9/23/15/jm)

<table>
<thead>
<tr>
<th>Course Code</th>
<th>Course Title</th>
<th>Prerequisites</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS 180</td>
<td>Object-Oriented Programming I (4)</td>
<td></td>
</tr>
<tr>
<td>CIS 181</td>
<td>Object-Oriented Programming II (4) (Pre: CIS 180)</td>
<td></td>
</tr>
<tr>
<td>CIS 190</td>
<td>Introduction to Procedural Programming (4) (Pre: CIS 180)</td>
<td></td>
</tr>
<tr>
<td>CIS 264</td>
<td>Software Quality Assurance and Testing (3)</td>
<td></td>
</tr>
<tr>
<td>CIS 272</td>
<td>Introduction to Computing Systems (4) (Co: CIS 190, MTH 181)</td>
<td></td>
</tr>
<tr>
<td>CIS 280</td>
<td>Software Specification and Design (4) (Pre: CIS 181)</td>
<td></td>
</tr>
<tr>
<td>CIS 340</td>
<td>Large Software Systems (3) (Pre: CIS 280)</td>
<td></td>
</tr>
<tr>
<td>CIS 360</td>
<td>Algorithms and Data Structures (3) (Pre: CIS 181, CIS 190, MTH 181)</td>
<td></td>
</tr>
<tr>
<td>CIS 440</td>
<td>Software Process and Project Management (3)</td>
<td></td>
</tr>
<tr>
<td>CIS 461</td>
<td>Formal Methods in Software Engineering (3)</td>
<td></td>
</tr>
<tr>
<td>CIS 498</td>
<td>Software Engineering Project I (4) (Pre: CIS 280, CIS 362) - USC 5A</td>
<td></td>
</tr>
<tr>
<td>CIS 499</td>
<td>Software Engineering Project II (3) (Pre: CIS 498) - USC 5B</td>
<td></td>
</tr>
</tbody>
</table>

### CIS Electives, 4 courses required, (Grade of "C" or better) - Minimum 12 Credits

- CIS 314 - Computer Architecture (4) (Pre: CIS 273, CIS 360)
- CIS 410 - Programming Language Design (3) (Pre: CIS 360)
- CIS 412 - Artificial Intelligence (3) (Pre: CIS 360)
- CIS 421 - Introduction to Theory of Computation (3) (Pre: CIS 361)
- CIS 422 - Design of Parallel Algorithms (4) (Pre: CIS 360)
- CIS 430 - Data Mining and Knowledge Discovery (3) (Pre: CIS 360)
- CIS 431 - Human Computer Interaction (4) (Pre: CIS 362)
- CIS 433 - Mobile Application Development with Android (3) (Pre: CIS 360)
- CIS 434 - Mobile Application Development with iOS (3) (Pre: CIS 360)
- CIS 452 - Database Systems (3) (Pre: CIS 280)
- CIS 454 - Computer Graphics (3) (Pre: CIS Jr/Sr)
- CIS 455 - Bioinformatics (3) (Pre: CIS 360, CIS 362)
- CIS 463 - Game Engine Design (3) (Pre: CIS Jr/Sr)
- CIS 464 - Computer Game Design (3) (Pre: CIS 360)
- CIS 465 - Topics in Computer Vision (3) (Pre: CIS 360)
- CIS 466 - Introduction to Mobile Robotics (3) (Pre: CIS 360)
- CIS 467 - Image Analysis and Processing (3) (Pre: CIS 360)
- CIS 471 - Compiler Design (3) (Pre: CIS 360)
- CIS 475 - Computer Networks (3) (Pre: CIS 272, CIS 360)
- CIS 476 - Networking Programming (3) (Pre: CIS 272, CIS 360)
- CIS 477 - Computer and Information System Security (3) (Pre: CIS 360)
- CIS 481 - Parallel and Distributed Software Systems (3) (Pre: CIS 280, CIS 370)
- CIS 490 - Machine Learning (3) (Pre: CIS 360)

### Mathematics Requirements - 17 Credits

- MTH 153 (or MTH 151) - Calculus I (4) - USC 1D
- MTH 154 (or MTH 152) - Calculus II (4) (Pre: MTH 153 or 151)
- MTH 181 - Discrete Structures I (3)
- MTH 182 - Discrete Structures II (3) (Pre: MTH 181)
- MTH 331 - Probability (3) (Pre: MTH 154 or 152)
- MTH 155 - Calculus with Analytic Geometry (4) (Pre: MTH 154 or 152)

### Science/Quantitative Requirements - Minimum 14 Credits

- PHY 113 - BIO 121/131 - CHM 151/161 (4) (Circle one)
- PHY 114 - BIO 122/132 - CHM 152/162 (4) (Must be continuation of above)
- Science Elective (Must satisfy USC 2A if CHM Track) (3)
- CIS 362 - Empirical Methods for Computer Science (3) (Pre: CIS 280, MTH 154)

### English Requirements/Foundations for Engagement - 9 Credits

- ENL 101 - Critical Writing and Reading I (3) - USC 1A
- ENL 102 - Critical Writing and Reading II (3) - USC 1B (Pre: ENL 101)
- ENL 266 - Technical Communications (3) - USC 1C (Pre: ENL 102)

### Ethics and Social Responsibility/Science in the Engaged Community - 3 Credits

- CIS 381 - Social and Ethical Aspects of Computing (3) - USC 2B

### University Studies** - 18 Credits

- EGR 111 (3) - USC 1E (Transfer students may substitute CIS 2xx+ course)
- Literature (3) - Choose from USC 3A
- Visual and Performing Arts (3) - Choose from USC 3B
- Human Questions and Contexts (3) - Choose from USC 4A
- Nature of US Society (3) - Choose from USC 4B
- Nature of the Global Society (3) - Choose from USC 4C

### Free Electives - Single Class or a Combination that adds up to 5 Credits

- **Note:** Any CIS core course or technical elective that is a prerequisite to another CIS course, must be passed with a grade of C or better in order to satisfy the prerequisite.

---

**GPA of 2.0 or better to graduate**

**USC -University Studies Cluster:** A preapproved list can be found at: [http://www.umassd.edu/universitystudies/approvedcourses/](http://www.umassd.edu/universitystudies/approvedcourses/)