COMPUTER SCIENCE MAJOR: SOFTWARE ENGINEERING COMPREHENSIVE EMPHASIS

Program Requirements
A minimum of 60 credits is required, including the 30-credit Computer Science Core:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 190</td>
<td>Computer Science I</td>
<td>3</td>
</tr>
<tr>
<td>CS 191</td>
<td>Computer Science II</td>
<td>3</td>
</tr>
<tr>
<td>CS 195</td>
<td>Database Management Systems</td>
<td>3</td>
</tr>
<tr>
<td>CS 250</td>
<td>Web Applications Development I</td>
<td>3</td>
</tr>
<tr>
<td>CS 280</td>
<td>Data Structures</td>
<td>3</td>
</tr>
<tr>
<td>CS 330</td>
<td>Operating Systems and Architecture</td>
<td>3</td>
</tr>
<tr>
<td>CS 370</td>
<td>Systems Programming in C</td>
<td>3</td>
</tr>
<tr>
<td>CS 412</td>
<td>Software Engineering</td>
<td>3</td>
</tr>
<tr>
<td>CS 470</td>
<td>Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS 495</td>
<td>Senior Project</td>
<td>3</td>
</tr>
</tbody>
</table>

Total Credits                                      30

And the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 303</td>
<td>Machine Learning</td>
<td>3</td>
</tr>
<tr>
<td>CS 350</td>
<td>Web Applications Development II</td>
<td>3</td>
</tr>
<tr>
<td>CS 380</td>
<td>The Internet of Things</td>
<td>3</td>
</tr>
<tr>
<td>CS 435</td>
<td>Mobile Development</td>
<td>3</td>
</tr>
<tr>
<td>MATH 213</td>
<td>Probability and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 260</td>
<td>Applied Linear Algebra</td>
<td>3</td>
</tr>
</tbody>
</table>

And five of the following:                          25

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 235</td>
<td>Computers Networks</td>
<td></td>
</tr>
<tr>
<td>CS 310</td>
<td>Programming Projects with X</td>
<td></td>
</tr>
<tr>
<td>CS 317</td>
<td>Genome Analysis (with laboratory)</td>
<td></td>
</tr>
<tr>
<td>CS 320</td>
<td>Programming Languages</td>
<td></td>
</tr>
<tr>
<td>CS 340</td>
<td>Computer Graphics</td>
<td></td>
</tr>
<tr>
<td>CS 360</td>
<td>System Security</td>
<td></td>
</tr>
<tr>
<td>CS 390</td>
<td>Software Entrepreneurship</td>
<td></td>
</tr>
<tr>
<td>CS 415</td>
<td>Software Engineering II</td>
<td></td>
</tr>
<tr>
<td>CS 450</td>
<td>Ethical Hacking and Malware</td>
<td></td>
</tr>
<tr>
<td>CS 460</td>
<td>Network Security</td>
<td></td>
</tr>
<tr>
<td>CS 499</td>
<td>Internship or Field Experience in Computer Science</td>
<td></td>
</tr>
<tr>
<td>ENG 302</td>
<td>Technical Writing</td>
<td></td>
</tr>
</tbody>
</table>

including no more than one of the following:        3-4

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>MATH 151</td>
<td>Calculus I (GTMA1)</td>
<td></td>
</tr>
<tr>
<td>MATH 200</td>
<td>Discrete Mathematics</td>
<td></td>
</tr>
<tr>
<td>MATH 213</td>
<td>Probability and Statistics</td>
<td></td>
</tr>
<tr>
<td>MATH 260</td>
<td>Applied Linear Algebra</td>
<td></td>
</tr>
</tbody>
</table>

MATH 380 | Introduction to Cryptography             Total Credits 43-44

Capstone Course Requirement
The following course fulfills the capstone course requirement in the Computer Science Major: CS 495 SENIOR PROJECT.

Graduation Requirements
Undergraduate programs require a minimum of 120 semester credits for graduation. Of those 120 credits, 40 credits must be in upper-division courses (those marked 300 and above). Fifteen of these 40 upper-division credits must be earned in courses that are part of the standard or comprehensive major program being pursued.

Students are expected to review all graduation requirements, which can be found in the Western Undergraduate Catalog: Graduation Requirements (https://catalog.western.edu/undergraduate/graduation-requirements/).

Year One

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 190</td>
<td>Computer Science I</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective or minor course</td>
<td>3</td>
</tr>
<tr>
<td>ENG 102</td>
<td>Academic Writing (GT-CO1)</td>
<td>3</td>
</tr>
<tr>
<td>Gen Ed</td>
<td>Arts &amp; Humanities</td>
<td>3</td>
</tr>
<tr>
<td>HWTR 100</td>
<td>First Year Seminar</td>
<td>1</td>
</tr>
<tr>
<td>MATH 141</td>
<td>Precalculus (GTMA1)</td>
<td>4</td>
</tr>
<tr>
<td>or MATH 151</td>
<td>Calculus I (GTMA1)</td>
<td></td>
</tr>
</tbody>
</table>

Credits                                  17

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS 191</td>
<td>Computer Science II</td>
<td>3</td>
</tr>
<tr>
<td>CS 195</td>
<td>Database Management Systems</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective or minor course</td>
<td>3</td>
</tr>
<tr>
<td>Gen Ed</td>
<td>Arts &amp; Humanities</td>
<td>3</td>
</tr>
<tr>
<td>Gen Ed</td>
<td>Social Sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

Credits                                  15

Year Two

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 280</td>
<td>Data Structures</td>
<td>3</td>
</tr>
<tr>
<td>CS 330</td>
<td>Operating Systems and Architecture</td>
<td>3</td>
</tr>
<tr>
<td>MATH 213</td>
<td>Probability and Statistics</td>
<td>3</td>
</tr>
<tr>
<td>or MATH 260</td>
<td>Applied Linear Algebra</td>
<td></td>
</tr>
<tr>
<td>Gen Ed</td>
<td>Natural Sciences w/lab</td>
<td>4</td>
</tr>
<tr>
<td>Gen Ed</td>
<td>Social Sciences</td>
<td>3</td>
</tr>
</tbody>
</table>

Credits                                  16

Spring

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>COM 202</td>
<td>Academic Writing and Inquiry (GT-CO2)</td>
<td>3</td>
</tr>
<tr>
<td>CS 380</td>
<td>The Internet of Things</td>
<td>3</td>
</tr>
<tr>
<td>or CS 350</td>
<td>Web Applications Development II</td>
<td></td>
</tr>
<tr>
<td>CS 412</td>
<td>Software Engineering</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective or minor course</td>
<td>3</td>
</tr>
<tr>
<td>Gen Ed</td>
<td>Natural Sciences w/lab</td>
<td>4</td>
</tr>
</tbody>
</table>

Credits                                  16

Year Three

<table>
<thead>
<tr>
<th>Course</th>
<th>Title</th>
<th>Credits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fall</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 250</td>
<td>Web Applications Development I</td>
<td>3</td>
</tr>
<tr>
<td>or CS 330</td>
<td>Operating Systems and Architecture</td>
<td></td>
</tr>
<tr>
<td>CS 425</td>
<td>Mobile Development</td>
<td>3</td>
</tr>
<tr>
<td>or CS 303</td>
<td>Machine Learning</td>
<td></td>
</tr>
<tr>
<td>CS</td>
<td>CS elective</td>
<td>3</td>
</tr>
</tbody>
</table>

Credits                                  16
<table>
<thead>
<tr>
<th>Elective</th>
<th>Elective or minor course</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gen Ed</td>
<td>Social Sciences</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Credits</strong></td>
<td><strong>15</strong></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 350</td>
<td>Web Applications Development II</td>
<td>3</td>
</tr>
<tr>
<td>or CS 380</td>
<td>or The Internet of Things</td>
<td></td>
</tr>
<tr>
<td>CS 370</td>
<td>Systems Programming in C</td>
<td>3</td>
</tr>
<tr>
<td>CS</td>
<td>Upper division CS elective</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective or minor course</td>
<td>3</td>
</tr>
<tr>
<td>Gen Ed</td>
<td>Arts &amp; Humanities</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Credits</strong></td>
<td><strong>15</strong></td>
</tr>
<tr>
<td><strong>Year Four</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Fall</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 303</td>
<td>Machine Learning</td>
<td>3</td>
</tr>
<tr>
<td>or CS 435</td>
<td>or Mobile Development</td>
<td></td>
</tr>
<tr>
<td>CS 470</td>
<td>Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CS</td>
<td>Upper division CS elective</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective or minor course</td>
<td>3</td>
</tr>
<tr>
<td>Elective</td>
<td>Upper division elective or minor course</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Credits</strong></td>
<td><strong>15</strong></td>
</tr>
<tr>
<td><strong>Spring</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>CS 495</td>
<td>Senior Project</td>
<td>3</td>
</tr>
<tr>
<td>CS</td>
<td>Upper division CS elective</td>
<td>6</td>
</tr>
<tr>
<td>Elective</td>
<td>Elective or minor course</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Credits</strong></td>
<td><strong>12</strong></td>
</tr>
<tr>
<td></td>
<td><strong>Total Credits</strong></td>
<td><strong>121</strong></td>
</tr>
</tbody>
</table>