Computer Science, B.S.

Learn more about the Bachelor of Science in Computer Science.

Temple’s B.S. in Computer Science provides an in-depth study of the science of computing, including mathematical/theoretical foundations as well as systems and application software development. Students take electives (4-5 courses) in topics such as artificial intelligence, machine learning, robotics, computer vision, graphics, game programming, bioinformatics, databases, big data, mobile and web application development, cloud computing, high performance computing, wireless and sensor networks, network and information security, and digital forensics. The program is for students with an interest in the fundamentals of computing, who want to be able to contribute to innovative research and product development. Our graduates have careers in software development, systems analysis, and consulting; they are also prepared for graduate study and research in Computer and Information Sciences.

Undergraduate Contact Information:

Dr. Jamie Payton, Chair
Science Education and Research Center, Room 304
215-204-8450

Dr. Gene Kwatny, Vice Chair
Science Education and Research Center, Room 304
215-204-8450

Sally Kyvernitis, Faculty Advisor
Science Education and Research Center, Room 330
215-204-2030
sallyk@temple.edu

Bachelor of Science

Summary of Requirements for the Degree

1. University Requirements (123 total s.h.)
   • Students must complete all University requirements including those listed below.
   • All Temple students must take a minimum of two writing-intensive courses at Temple as part of their major. The specific writing-intensive course options for this major are:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS 3296</td>
<td>Software Design</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Second writing intensive course can be chosen from:</td>
<td></td>
</tr>
<tr>
<td>CIS 4397</td>
<td>Independent Research in Computer Science</td>
<td>3</td>
</tr>
<tr>
<td>CIS 4398</td>
<td>Projects in Computer Science</td>
<td>3</td>
</tr>
</tbody>
</table>

   • Students must complete the General Education (GenEd) requirements.
     • See the General Education section of the Undergraduate Bulletin for the GenEd curriculum.
     • Students who complete CST majors receive a waiver for 2 Science & Technology (GS) and 1 Quantitative Literacy (GQ) GenEd courses.
   • Students must satisfy general Temple University residency requirements.

2. College Requirements
   • 45 Upper Level (2000+) credits within the College of Science & Technology (CST), the College of Liberal Arts (CLA), or the College of Engineering (ENG).
   • 90 credits within the College of Science & Technology (CST), the College of Liberal Arts (CLA), or the College of Engineering (ENG).
   • All students in the College of Science and Technology are required to take a one credit first year seminar. SCTC 1001 CST First Year Seminar is the appropriate course option for every entering first year CST major. Transfer students should use SCTC 2001 CST Transfer Seminar to fulfill this requirement. Other courses that fulfill this requirement may be found on the CST College Requirements page.

3. Major Requirements for Bachelor of Science (73-74 s.h.)
   At least 9 courses required for the major must be completed at Temple. At least 7 CIS courses must be completed at Temple.
<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CIS 1001</td>
<td>Introduction to Academics in Computer Science</td>
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<tr>
<td>CIS 1051</td>
<td>Introduction to Problem Solving and Programming in Python</td>
<td>4</td>
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<tr>
<td>or CIS 1057</td>
<td>Computer Programming in C</td>
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<tr>
<td>CIS 1068</td>
<td>Program Design and Abstraction</td>
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<tr>
<td>or CIS 1968</td>
<td>Honors Program Design and Abstraction</td>
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<tr>
<td>CIS 1166</td>
<td>Mathematical Concepts in Computing I</td>
<td>4</td>
</tr>
<tr>
<td>or CIS 1966</td>
<td>Honors Mathematical Concepts in Computing I</td>
<td></td>
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<tr>
<td>CIS 2033</td>
<td>Computational Probability and Statistics</td>
<td>3</td>
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<tr>
<td>CIS 2107</td>
<td>Computer Systems and Low-Level Programming</td>
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</tr>
<tr>
<td>CIS 2166</td>
<td>Mathematical Concepts in Computing II</td>
<td>4</td>
</tr>
<tr>
<td>CIS 2168</td>
<td>Data Structures</td>
<td>4</td>
</tr>
<tr>
<td>CIS 3207</td>
<td>Introduction to Systems Programming and Operating Systems</td>
<td>4</td>
</tr>
<tr>
<td>CIS 3223</td>
<td>Data Structures and Algorithms</td>
<td>3</td>
</tr>
<tr>
<td>CIS 3296</td>
<td>Software Design</td>
<td>4</td>
</tr>
<tr>
<td>CIS 4398</td>
<td>Projects in Computer Science</td>
<td>3</td>
</tr>
<tr>
<td>or CIS 4397</td>
<td>Independent Research in Computer Science</td>
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</table>

### Computer Science Electives

Select 15-16 credits from the following CS elective courses:

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CIS 3203</td>
<td>Introduction to Artificial Intelligence</td>
<td></td>
</tr>
<tr>
<td>CIS 3211</td>
<td>Automata, Computability, and Languages</td>
<td></td>
</tr>
<tr>
<td>CIS 3217</td>
<td>Computer Architecture</td>
<td></td>
</tr>
<tr>
<td>CIS 3219</td>
<td>Computer Graphics and Image Processing</td>
<td></td>
</tr>
<tr>
<td>CIS 3242</td>
<td>Discrete Structures</td>
<td></td>
</tr>
<tr>
<td>CIS 3308</td>
<td>Web Application Programming</td>
<td></td>
</tr>
<tr>
<td>CIS 3319</td>
<td>Wireless Networks and Security</td>
<td></td>
</tr>
<tr>
<td>CIS 3381</td>
<td>Cooperative Education Experience in Computer Science</td>
<td>3</td>
</tr>
<tr>
<td>CIS 3441</td>
<td>Software Security</td>
<td></td>
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<tr>
<td>CIS 3515</td>
<td>Introduction to Mobile Application Development</td>
<td></td>
</tr>
<tr>
<td>CIS 3603</td>
<td>User Experience Design</td>
<td></td>
</tr>
<tr>
<td>CIS 3605</td>
<td>Introduction to Digital Forensics</td>
<td></td>
</tr>
<tr>
<td>CIS 3715</td>
<td>Principles of Data Science</td>
<td></td>
</tr>
<tr>
<td>CIS 4282</td>
<td>Independent Study</td>
<td>3</td>
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<tr>
<td>CIS 4305</td>
<td>Real Time Computer Systems (Not offered every year)</td>
<td></td>
</tr>
<tr>
<td>CIS 4307</td>
<td>Introduction to Distributed Systems and Networks (Not offered every year)</td>
<td></td>
</tr>
<tr>
<td>CIS 4308</td>
<td>Development of Multi-tier Client/Server Systems (Not offered every year)</td>
<td></td>
</tr>
<tr>
<td>CIS 4319</td>
<td>Computer Networks and Communications</td>
<td></td>
</tr>
<tr>
<td>CIS 4324</td>
<td>Compiler Design (Not offered every year)</td>
<td></td>
</tr>
<tr>
<td>CIS 4331</td>
<td>Principles of Database Systems</td>
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<tr>
<td>CIS 4350</td>
<td>Seminar on Topics in Computer Science</td>
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<tr>
<td>CIS 4360</td>
<td>Seminar on Topics in Computer Science</td>
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</tr>
<tr>
<td>CIS 4382</td>
<td>Independent Study</td>
<td>3</td>
</tr>
<tr>
<td>CIS 4397</td>
<td>Independent Research in Computer Science (if not taken as capstone requirement)</td>
<td>1</td>
</tr>
<tr>
<td>or CIS 4398</td>
<td>Projects in Computer Science</td>
<td></td>
</tr>
<tr>
<td>CIS 4515</td>
<td>Advanced Mobile Application Development</td>
<td></td>
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<tr>
<td>CIS 4517</td>
<td>Data-Intensive and Cloud Computing</td>
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<tr>
<td>CIS 4523</td>
<td>Knowledge Discovery and Data Mining</td>
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<tr>
<td>CIS 4524</td>
<td>Analysis and Modeling of Social and Information Networks</td>
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<tr>
<td>CIS 4526</td>
<td>Foundations of Machine Learning</td>
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</tr>
<tr>
<td>CIS 4615</td>
<td>Ethical Hacking and Intrusion Forensics</td>
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</tr>
</tbody>
</table>
Computer Science, B.S.

Mathematics
MATH 1041 Calculus I 4
or MATH 1941 Honors Calculus I
MATH 1042 Calculus II 4
or MATH 1942 Honors Calculus II

Laboratory Science courses
Two (2) laboratory science courses 8

Total Credit Hours 73-74

1 GPA and other requirements are needed to register for CIS 4397.

2 Students can count one of the following as a CS elective course: MATH 2101 Linear Algebra, MATH 2103 Linear Algebra with Computer Lab, MATH 2043 Calculus III.

3 A maximum of eight (8) credits may be taken from CIS 3381, CIS 4282 and/or CIS 4382 to fulfill Computer Science elective requirements. In addition, a maximum of four (4) credits may be taken from CIS 3381 to fulfill Computer Science elective requirements.

4 Must select one Lab Science Sequence from the options listed below. Lab Science A and Lab Science B must be taken from the same department.

Sequenced Computer Science BS Laboratory Science Requirements

<table>
<thead>
<tr>
<th>Code</th>
<th>Title</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>Biology Sequence 1</td>
<td></td>
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</tr>
<tr>
<td>Select one Biology Lab Science A:</td>
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<td></td>
</tr>
<tr>
<td>BIOL 1111 Introduction to Organismal Biology</td>
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<tr>
<td>BIOL 1911 Honors Introduction to Organismal Biology</td>
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<tr>
<td>Select one Biology Lab Science B:</td>
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<td></td>
</tr>
<tr>
<td>BIOL 2112 Introduction to Cellular and Molecular Biology</td>
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<td></td>
</tr>
<tr>
<td>BIOL 2912 Honors Introduction to Cellular and Molecular Biology</td>
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<tr>
<td>Chemistry Sequence 2</td>
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<tr>
<td>Select one Chemistry Lab Science A:</td>
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</tr>
<tr>
<td>CHEM 1031 &amp; CHEM 1033 General Chemistry I and General Chemistry Laboratory I</td>
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</tr>
<tr>
<td>CHEM 1951 &amp; CHEM 1953 Honors General Chemical Science I and Honors Chemical Science Laboratory I</td>
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<td></td>
</tr>
<tr>
<td>Select one Chemistry Lab Science B:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>CHEM 1032 &amp; CHEM 1034 General Chemistry II and General Chemistry Laboratory II</td>
<td></td>
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</tr>
<tr>
<td>CHEM 1952 &amp; CHEM 1954 Honors General Chemical Science II and Honors Chemical Science Laboratory II</td>
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<tr>
<td>Earth &amp; Environmental Science Sequence 3</td>
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<tr>
<td>Select this Lab Science A:</td>
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<tr>
<td>EES 2001 Physical Geology</td>
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<tr>
<td>Select one Lab Science B:</td>
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</tr>
<tr>
<td>EES 2011 Mineralogy I (with CHEM 1031 prerequisite)</td>
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<tr>
<td>EES 2021 Sedimentary Environments (no CHEM 1031 prerequisite)</td>
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<tr>
<td>EES 2061 Introduction to Geochemistry (with CHEM 1031 prerequisite)</td>
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<tr>
<td>Physics Sequence 4</td>
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<tr>
<td>Select one Physics Lab Science A:</td>
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<tr>
<td>PHYS 1061 Elementary Classical Physics I</td>
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<tr>
<td>PHYS 1961 Honors Elementary Classical Physics I</td>
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</tr>
<tr>
<td>PHYS 2021 General Physics I</td>
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<td></td>
</tr>
<tr>
<td>PHYS 2921 Honors General Physics I</td>
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<tr>
<td>Select one Physics Lab Science B:</td>
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<td></td>
</tr>
<tr>
<td>PHYS 1062 Elementary Classical Physics II</td>
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</tbody>
</table>
Several prerequisite courses are required if you select the Biology sequence.

Students can choose to mix-and-match the Chemistry Sequence A and B courses. However, they must take at least 1 course from Chemistry Sequence A and 1 from Chemistry Sequence B. Note: Chemistry courses consist of a three-credit lecture plus a one-credit lab.

For the EES Sequence, two of the three Lab Science B options require students to take CHEM 1031 as a prerequisite, but EES 2021 does not.

Students can choose to mix-and-match the Physics Sequence A and B courses. However, they must take at least 1 course from Physics Sequence A and 1 from Physics Sequence B.

Calculation of Major GPA

Courses listed under the major requirements for the degree will be included in the calculation of the major GPA. Courses that could not apply toward the major as an elective or required course would not be counted in the calculation of the major GPA. This would include CIS 1056, for example.

Distinction in Major

To graduate with Distinction in Major, students are required to have a 3.50 or higher grade point average (GPA) both in the major and overall, as well as be recommended by the department of Computer & Information Sciences.

Suggested Academic Plan

Bachelor of Science in Computer Science

Requirements for New Students starting in the 2021-2022 Academic Year

<table>
<thead>
<tr>
<th>Year 1</th>
<th>Fall</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS 1001</td>
<td>Introduction to Academics in Computer Science</td>
<td>1</td>
</tr>
<tr>
<td>Select one of</td>
<td></td>
<td></td>
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<tr>
<td>the following:</td>
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<td>4</td>
</tr>
<tr>
<td>CIS 1051</td>
<td>Introduction to Problem Solving and Programming in Python</td>
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<tr>
<td>CIS 1057</td>
<td>Computer Programming in C</td>
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</tr>
<tr>
<td>MATH 1041 or</td>
<td>Calculus I</td>
<td>4</td>
</tr>
<tr>
<td>1941</td>
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<tr>
<td>SCTC 1001</td>
<td>CST First Year Seminar</td>
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<tr>
<td>ENG 0802, 0812,</td>
<td>Analytical Reading and Writing [GW]</td>
<td>4</td>
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<tr>
<td>or 0902</td>
<td></td>
<td></td>
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<tr>
<td>Elective</td>
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<tr>
<td>**Term Credit</td>
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<td>15</td>
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<tr>
<td>Hours**</td>
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<thead>
<tr>
<th>Year 2</th>
<th>Fall</th>
<th>Credit Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>CIS 2168</td>
<td>Data Structures</td>
<td>4</td>
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<tr>
<td>IH 0852 or 0952</td>
<td>Intellectural Heritage II: The Common Good [GZ]</td>
<td>3</td>
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<td>GenEd Breadth Course</td>
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<td>3</td>
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<tr>
<td>Elective</td>
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<tr>
<td>**Term Credit</td>
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<td>15</td>
</tr>
<tr>
<td>Hours**</td>
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<table>
<thead>
<tr>
<th>Year 2</th>
<th>Spring</th>
<th>Credit Hours</th>
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<tbody>
<tr>
<td>CIS 2033</td>
<td>Computational Probability and Statistics</td>
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<td>CIS 2107</td>
<td>Computer Systems and Low-Level Programming</td>
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<td>GenEd Breadth Course</td>
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<tr>
<td>Term</td>
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<td>Course Name</td>
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<td>Fall</td>
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<tr>
<td></td>
<td>CIS 2166</td>
<td>Mathematical Concepts in Computing II</td>
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<tr>
<td></td>
<td>CIS 3207</td>
<td>Introduction to Systems Programming and Operating Systems</td>
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<tr>
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<td>CS BS Laboratory Science A</td>
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<td><strong>Term Credit Hours</strong></td>
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<tr>
<td>Spring</td>
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<tr>
<td></td>
<td>CIS 3223</td>
<td>Data Structures and Algorithms</td>
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<td>Computer Science Elective¹</td>
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<td><strong>Term Credit Hours</strong></td>
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<tr>
<td>Fall</td>
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<tr>
<td></td>
<td>CIS 3296</td>
<td>Software Design [WI]</td>
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<tr>
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<td>Spring</td>
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<tr>
<td></td>
<td>CIS 4397 or 4398</td>
<td>Independent Research in Computer Science [WI]</td>
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<td>Computer Science Elective¹</td>
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<tr>
<td></td>
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<td><strong>Total Credit Hours:</strong></td>
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</table>

¹ Select from the Computer Science Electives list under Requirements.