<table>
<thead>
<tr>
<th>Critical</th>
<th>Course Subject and Title</th>
<th>Credit Hours</th>
<th>Min. Grade</th>
<th>Major GPA</th>
<th>Code</th>
<th>Prerequisites</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Semester One (17-18 Credit Hours)</td>
<td>! ENGL 101 Critical Reading and Composition</td>
<td>3</td>
<td>C</td>
<td>CC-CMW</td>
<td>PR</td>
<td>MATH 112/115/116 or Math placement test</td>
<td>Approved Elective (minor)</td>
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<tr>
<td></td>
<td>MATH 141 Calculus I</td>
<td>4</td>
<td>C</td>
<td>CC-ARP</td>
<td>PR</td>
<td>Grade of C or higher in MATH 141 or higher math (or by placement score into</td>
<td>Approved Elective (minor)</td>
</tr>
<tr>
<td></td>
<td>CHEM 141 Principles of Chemistry I</td>
<td>4</td>
<td>C</td>
<td>PR</td>
<td>CC-GFL</td>
<td>MATH 142 Calculus II</td>
<td>Carolina Core Requirement</td>
</tr>
<tr>
<td></td>
<td>Foreign language or other Carolina Core</td>
<td>3-4</td>
<td></td>
<td>CC-GFL</td>
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<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
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<tr>
<td></td>
<td>Requirement</td>
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<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
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<td></td>
<td>ENIV 101 The Student in the University</td>
<td>3</td>
<td>PR/CC</td>
<td></td>
<td></td>
<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
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<tr>
<td>Semester Two (15 Credit Hours)</td>
<td>! ENGL 102 Rhetoric and Composition</td>
<td>3</td>
<td>C</td>
<td>CC-CMW</td>
<td>PR</td>
<td>MATH 141 Calculus II</td>
<td>Carolina Core Requirement</td>
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<tr>
<td></td>
<td>MATH 142 Calculus II</td>
<td>4</td>
<td>C</td>
<td>CC-ARP</td>
<td>PR</td>
<td>Grade of C or higher in MATH 141</td>
<td>Carolina Core Requirement</td>
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<tr>
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<td>CHEM 142 Principles of Chemistry II</td>
<td>4</td>
<td>C</td>
<td>PR</td>
<td>CC-GFL</td>
<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
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<td></td>
<td>PHYS 211 Essentials of Physics I</td>
<td>3</td>
<td>C</td>
<td>CC-SCI</td>
<td>PR</td>
<td>MATH 141; Coreq: PHYS 211L</td>
<td>Carolina Core Requirement</td>
</tr>
<tr>
<td></td>
<td>PHYS 211L Essentials of Physics I Lab</td>
<td>1</td>
<td>C</td>
<td>CC-SCI</td>
<td>PR</td>
<td>Phys 211 &amp; MATH 142; Coreq: PHYS 211L</td>
<td>Carolina Core Requirement</td>
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<tr>
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<td>Foreign language or other Carolina Core</td>
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<td>CC-GFL</td>
<td></td>
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<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
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<tr>
<td>Semester Three (15 Credit Hours)</td>
<td>MATH 241 Vector Calculus</td>
<td>3</td>
<td>PR</td>
<td>MATH 142</td>
<td>PR</td>
<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
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<td></td>
<td>CHEM 333 Organic Chemistry I</td>
<td>3</td>
<td>C</td>
<td>MR</td>
<td>CHEM 112 or CHEM 142</td>
<td>Carolina Core Requirement</td>
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<td></td>
<td>CHEM 333L Organic Chemistry I Lab</td>
<td>2</td>
<td>C</td>
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<td>CHEM 333</td>
<td>Prereq or Coreq: CHEM 333</td>
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<td></td>
<td>PHYS 212 Essentials of Physics II</td>
<td>3</td>
<td>C</td>
<td>CC-SCI</td>
<td>PHYS 211 &amp; MATH 142; Coreq: PHYS 212L</td>
<td>Carolina Core Requirement</td>
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<td></td>
<td>PHYS 212L Essentials of Physics II Lab</td>
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<td>PHYS 212</td>
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<td>CC-GFL</td>
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<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
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<tr>
<td>Semester Four (15 Credit Hours)</td>
<td>CHEM 322 Analytical Chemistry</td>
<td>3</td>
<td>C</td>
<td>MR</td>
<td>CHEM 112/115L or CHEM 142; MATH 141; Coreq: CHEM 322L</td>
<td>Carolina Core Requirement</td>
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<td></td>
<td>CHEM 322L Analytical Chemistry Lab</td>
<td>1</td>
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<td>CHEM 322</td>
<td>Coreq: CHEM 322</td>
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<td>CHEM 334 Organic Chemistry II</td>
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<td>MR</td>
<td>CHEM 333</td>
<td>Prereq: CHEM 333; Coreq: CHEM 334</td>
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<td>CHEM 334L Organic Chemistry II Lab</td>
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<td>CHEM 333L; Prereq/Coreq: CHEM 334</td>
<td>Carolina Core Requirement</td>
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<tr>
<td></td>
<td>History</td>
<td>3</td>
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<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
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<td></td>
<td>Carolina Core Requirement</td>
<td>3</td>
<td>CC</td>
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<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
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<tr>
<td>Semester Five (14-17 Credit Hours)</td>
<td>CHEM Elective (optional)</td>
<td>3</td>
<td>C</td>
<td>MR</td>
<td>PR</td>
<td>See Bulletin listing.</td>
<td>Carolina Core Requirement</td>
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<td></td>
<td>CHEM 541 &amp; CHEM 541L – Physical Chemistry</td>
<td>5</td>
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<td>MR/CC-INT</td>
<td>PR</td>
<td>See Bulletin listing.</td>
<td>Carolina Core Requirement</td>
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<tr>
<td></td>
<td>CHEM 542 &amp; CHEM 542L – Physical Chemistry</td>
<td>5</td>
<td>C</td>
<td>MR/CC-INT</td>
<td>PR</td>
<td>See Bulletin listing.</td>
<td>Carolina Core Requirement</td>
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<tr>
<td></td>
<td>STAT 509 Statistics for Engineers or STAT 515 Statistical Methods only if needed</td>
<td>0-3</td>
<td>C</td>
<td>MR/CC-INT</td>
<td>PR</td>
<td>See Bulletin listing.</td>
<td>Carolina Core Requirement</td>
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<td></td>
<td>Cognate or Minor Course or Approved Elective</td>
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<td>C</td>
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<td>PR</td>
<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
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<tr>
<td></td>
<td>Humanities or Fine Arts</td>
<td>3</td>
<td>CR</td>
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<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
</tr>
<tr>
<td>Semester Six (14-15 Credit Hours)</td>
<td>CHEM 541 &amp; CHEM 541L – Physical Chemistry</td>
<td>5</td>
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<td>MR/CC-INT</td>
<td>PR</td>
<td>See Bulletin listing.</td>
<td>Carolina Core Requirement</td>
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<td></td>
<td>CHEM 145 Algorithmic Design I</td>
<td>3-4</td>
<td>CR</td>
<td>MR</td>
<td>PR</td>
<td>See Bulletin listing.</td>
<td>Carolina Core Requirement</td>
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<tr>
<td></td>
<td>Cognate or Minor Course or Approved Elective</td>
<td>3</td>
<td>C</td>
<td>PR</td>
<td>PR</td>
<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
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<tr>
<td></td>
<td>Social Science</td>
<td>3</td>
<td>CR</td>
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<td></td>
<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
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<tr>
<td></td>
<td>Carolina Core Requirement or Approved Elective</td>
<td>3</td>
<td>CC/PR</td>
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<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
</tr>
<tr>
<td>Semester Seven (12-15 Credit Hours)</td>
<td>CHEM 496-499 Undergraduate Research optional</td>
<td>0-3</td>
<td>C</td>
<td>MR</td>
<td>PR</td>
<td>Independent Study Contract Required</td>
<td>Carolina Core Requirement</td>
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<tr>
<td></td>
<td>Cognate or Minor Course or Approved Elective</td>
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<td>C</td>
<td>PR</td>
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<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
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<td>Cognate or Minor Course or Approved Elective</td>
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<td>C</td>
<td>PR</td>
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<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
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<tr>
<td></td>
<td>Carolina Core Requirement or Approved Elective</td>
<td>3</td>
<td>CC/PR</td>
<td></td>
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<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
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<tr>
<td>Semester Eight (15 Credit Hours)</td>
<td>Minor Course or Approved Elective</td>
<td>3</td>
<td>C</td>
<td>PR</td>
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<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
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<td>Minor Course or Approved Elective</td>
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<td>C</td>
<td>PR</td>
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<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
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<td></td>
<td>Approved Elective</td>
<td>3</td>
<td>PR</td>
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<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
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<td></td>
<td>Approved Elective</td>
<td>3</td>
<td>PR</td>
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<td></td>
<td>Note: Courses designated as critical (!) may have a deadline for completion or affect time to graduation.</td>
<td>Carolina Core Requirement</td>
</tr>
</tbody>
</table>

K. Shimizu
Graduation Requirements Summary

<table>
<thead>
<tr>
<th>Minimum Total Hours</th>
<th>Minimum Major Requirements Hours</th>
<th>College &amp; Program Requirements Hours</th>
<th>Carolina Core Hours</th>
<th>Minimum Institutional GPA</th>
</tr>
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<tbody>
<tr>
<td>120</td>
<td>27</td>
<td>47-60</td>
<td>34-46</td>
<td>2.000</td>
</tr>
</tbody>
</table>

1. Regardless of individual course grades, students must maintain a minimum 2.000 cumulative GPA.
2. Some colleges require a minimum GPA for major courses. Courses indicated in this column are included in the major GPA for this program of study.
3. Students who do not place into MATH 141 will be required to successfully complete MATH 112, 115, or 116 before taking MATH 141.
4. CHEM 111 and CHEM 111L may be taken in place of CHEM 141, and CHEM 112 and CHEM 112L may be taken in place of CHEM 142.
5. Students in the College of Arts and Sciences are required to demonstrate proficiency in one foreign language equivalent to the 122 course through course credit or the corresponding foreign language placement score.
6. The Carolina Core provides the common core of knowledge, skill and academic experience for all Carolina undergraduate students.
7. The cognate is intended to support the course work in the major. The cognate must consist of twelve hours of courses at the advanced level, outside of, but related to the major. In place of a cognate, a student may choose a minor consisting of at least 18 credit hours of courses concentrated in one area that follow a structured sequence. A second major eliminates the minor/cognate requirement. Students may use MATH 241, STAT 509/515, and PHYS 212 and 212L toward the cognate requirement, but would need to complete additional electives to meet hours to graduate.
8. If CHEM 141, 142, 322, and 322L (or CHEM 141, 142, 322 and 322L) are all completed at USC, STAT 509 or 515 is not required. Also, if CHEM 621 and 621L are completed, STAT 509 or 515 is not required. Students who exempt STAT 509 or 515 through this process will be required to take an approved elective to reach minimum hours for graduation.
9. The College of Arts and Sciences requires one U.S. History and one non-U.S. History course, both of which must be chosen from the approved Carolina Core GHS courses. Whichever is not fulfilled through the Carolina Core GHS requirement must be fulfilled through this college requirement.
10. CHEM Electives (3-4 hours)

Choose one from the following:

<table>
<thead>
<tr>
<th>Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>CHEM 511</td>
<td>Inorganic Chemistry (3)</td>
</tr>
<tr>
<td>CHEM 511L</td>
<td>Inorganic Chemistry (3)</td>
</tr>
<tr>
<td>CHEM 533</td>
<td>Comprehensive Organic Chemistry III (3)</td>
</tr>
<tr>
<td>CHEM 545</td>
<td>Physical Biochemistry (3)</td>
</tr>
<tr>
<td>CHEM 550</td>
<td>Biochemistry (3)</td>
</tr>
<tr>
<td>CHEM 555</td>
<td>Biochemistry/Molecular Biology I (3)</td>
</tr>
</tbody>
</table>

11. No courses of a remedial, developmental, skill-acquiring, or vocational nature may apply as credit toward degrees in the College of Arts and Sciences. The College of Arts and Sciences allows the use of the Pass-Fail option on elective courses. Further clarification on inapplicable courses can be obtained from the College of Arts and Sciences.
12. Students are encouraged to start undergraduate research as early as possible to allow participation in long-term projects. Three credits of undergraduate research are required, but additional research experience is recommended. Extramural Research opportunities, such as REU’s may qualify for CHEM 496-499 credit; however, a request form must be submitted and preapproved by the Department of Chemistry.

Program Notes:
- ENGL 101 and ENGL 102 must be completed in the student's first 60 semester hours of work in order for these courses to be credited toward graduation. CHEM 142 is a prerequisite for subsequent required courses and may delay progression if not taken in a timely manner.
- Any Chemistry or Biochemistry and Molecular Biology major can qualify for ACS certification by taking additional courses as listed: CHEM 511, CHEM 621, CHEM 621L, CHEM 550 or CHEM 555, and 6 credits of undergraduate research, CHEM 496-499.
- CHEM 401 Industrial Chemistry Capstone Experience is a recommended elective that prepares students for future roles in chemistry.
- Chemistry majors may enroll in a chemistry course a maximum of twice to earn the required grade of C or higher.
- A Chemistry major must receive a grade of C or higher in any chemistry course in order for it to be used to satisfy a major requirement.
- The last 30 credit hours toward your degree must be earned in residence at the University of South Carolina-Columbia.

University Requirements: Bachelor's degree-seeking students must meet Carolina Core (general education) requirements. For more information regarding these requirements, please visit the Carolina Core page on the University website.

<table>
<thead>
<tr>
<th>Codes</th>
<th>Description</th>
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<tbody>
<tr>
<td>CC</td>
<td>Carolina Core</td>
</tr>
<tr>
<td>CC-AIU</td>
<td>Carolina Core-Aesthetic and Interpretive Understanding</td>
</tr>
<tr>
<td>CC-ARP</td>
<td>Carolina Core-Analytical Reasoning and Problem-Solving</td>
</tr>
<tr>
<td>CC-CMS</td>
<td>Carolina Core-Effective, Engaged, and Persuasive Communication: Spoken Component</td>
</tr>
<tr>
<td>CC-CMV</td>
<td>Effective, Engaged, and Persuasive Communication: Written Component</td>
</tr>
<tr>
<td>CC-GFL</td>
<td>Carolina Core-Global Citizenship and Multicultural Understanding: Foreign Language</td>
</tr>
<tr>
<td>CC-GHS</td>
<td>Carolina Core – Historical Thinking</td>
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<tr>
<td>CC-GSS</td>
<td>Carolina Core – Social Sciences</td>
</tr>
</tbody>
</table>

CC-INF Carolina Core – Information Literacy
CC-INT Carolina Core – Integrative Course
CC-SGI Carolina Core – Scientific Literacy
CC-VSR Carolina Core – Values, Ethics, and Social Responsibility
CR College Requirement
MR Major Requirement
PR Program Requirement

Disclaimer: Major maps are only a suggested or recommended sequence of courses required in a program of study. Please contact your academic advisor for assistance in the application of specific coursework to a program of study and course selection and planning for upcoming semesters.