Applied Mathematics-Computer Science

The Sc.B. concentration in Applied Math-Computer Science provides a foundation of basic concepts and methodology of mathematical analysis and computation and prepares students for advanced work in computer science, applied mathematics, and scientific computation. Concentrators must complete courses in mathematics, applied math, computer science, and an approved English writing course. While the concentration in Applied Math-Computer Science allows students to develop the use of quantitative methods in thinking about and solving problems, knowledge that is valuable in all walks of life, students who have completed the concentration have pursued graduate study, computer consulting and information industries, and scientific and statistical analysis careers in industry or government. This degree offers a standard track and a professional track.

Requirements for the Standard Track of the Sc.B. degree.

**Prerequisites - two semesters of Calculus, for example**

**MATH 0990**  Introductory Calculus, Part I  & **MATH 0100**  and Introductory Calculus, Part II  **MATH 0170**  Advanced Placement Calculus

**Concentration Requirements (17 courses)**

**Core-Math:**

- **MATH 0180**  Intermediate Calculus
- or **MATH 0350**  Honors Calculus
- **MATH 0520**  Linear Algebra
- or **MATH 0540**  Honors Linear Algebra
- or **CSCI 0530**  Coding the Matrix: An Introduction to Linear Algebra for Computer Science

**Core-Applied Mathematics:**

- **APMA 0350**  Applied Ordinary Differential Equations
- **APMA 0360**  Applied Partial Differential Equations
- **APMA 1170**  Introduction to Computational Linear Algebra
- or **APMA 1180**  Introduction to Numerical Solution of Differential Equations

**Core-Computer Science:**

Select one of the following Series:

<table>
<thead>
<tr>
<th>Series A</th>
<th>Total Credits</th>
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<tbody>
<tr>
<td>CSCI 0150 &amp; CSCI 0160</td>
<td>1</td>
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<table>
<thead>
<tr>
<th>Series B</th>
<th>Total Credits</th>
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<tbody>
<tr>
<td>CSCI 0170 &amp; CSCI 0180</td>
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<tr>
<th>Series C</th>
<th>Total Credits</th>
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<tr>
<td>CSCI 0190</td>
<td>1</td>
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Select three of the following intermediate-level courses, one of which must be math-oriented and one systems-oriented. The intermediate courses must cover the requirements of the pathway chosen under additional requirements for CS:

<table>
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<tr>
<th>Course Code</th>
<th>Course Name</th>
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<tbody>
<tr>
<td>CSCI 0220</td>
<td>Introduction to Discrete Structures and Probability (math)</td>
</tr>
<tr>
<td>CSCI 0320</td>
<td>Introduction to Software Engineering (systems)</td>
</tr>
<tr>
<td>CSCI 0330</td>
<td>Introduction to Computer Systems (systems)</td>
</tr>
<tr>
<td>CSCI 1010</td>
<td>Theory of Computation (math)</td>
</tr>
<tr>
<td>CSCI 1450</td>
<td>Probability for Computing and Data Analysis (math)</td>
</tr>
<tr>
<td>or APMA 1650</td>
<td>Statistical Inference I</td>
</tr>
</tbody>
</table>

Three 1000-level Computer Science courses. Two of these courses and the intermediate courses must satisfy one of the CS pathways. 2

Three 1000-level Applied Mathematics courses approved by the concentration advisor, of which two should constitute a standard sequence or address a common theme. Typical sequences include: APMA 1200/1210 and APMA 1650 or 1655/1660. APMA 1910 cannot be used as an elective. A capstone course: a one-semester course, taken in the student's last undergraduate year, in which the student (or group of students) use a significant portion of their undergraduate education, broadly interpreted, in studying some current topic in depth, to produce a culminating artifact such as a paper or software project. The title and abstract of the artifact, along with the student's and faculty-sponsor's names, will be placed in the CS website. The inclusion of a relevant image or system diagram is strongly encouraged. The complete text of the best artifacts of each class will be featured on the CS website. A senior thesis, which involves two semesters of work, may count as a capstone. 1

Note: CSCI 1010 and 1450 may be used either as a math-oriented intermediate courses or as advanced courses. CSCI 1010 was formerly known as CSCI 510: they are the same course and hence only one may be taken for credit. CSCI 1450 was formerly known as CSCI 450: they are the same course and hence only one may be taken for credit. Applied Math 1650 or 1655 may only be used in place of CSCI 1450. However, concentration credit will be given for only one of Applied Math 1650, 1655, and CSCI 1450.

Total Credits 17

1 APMA 1650 may only be used if not being used as an Applied Math course.

2 Pathways may be viewed here: https://cs.brown.edu/degrees/undergrad/new-concentration-requirements/pathways-scb-and-ab-concentrations/

3 Capstone Options may be found here: http://cs.brown.edu/degrees/undergrad/concentrations/capstone/

Requirements for the Professional Track of the Sc.B. degree.

The requirements for the professional track include all those of the standard track, as well as the following:

Students must complete two two-to-four-month full-time professional experiences, doing work that is related to their concentration programs. Such work is normally done within an industrial organization, but may also be at a university under the supervision of a faculty member. On completion of each professional experience, the student must write and upload to ASK a reflective essay about the experience addressing the following prompts, to be approved by the student's concentration advisor:

- Which courses were put to use in your summer's work? Which topics, in particular, were important?
- In retrospect, which courses should you have taken before embarking on your summer experience? What are the topics from these courses that would have helped you over the summer if you had been more familiar with them?

Applied Mathematics-Computer Science
• Are there topics you should have been familiar with in preparation for your summer experience, but are not taught at Brown? What are these topics?
• What did you learn from the experience that probably could not have been picked up from course work?
• Is the sort of work you did over the summer something you would like to continue doing once you graduate? Explain.
• Would you recommend your summer experience to other Brown students? Explain.
Font Notice

This document should contain certain fonts with restrictive licenses. For this draft, substitutions were made using less legally restrictive fonts. Specifically:

Helvetica was used instead of Arial.

The editor may contact Leepfrog for a draft with the correct fonts in place.