1. Please describe and provide a rationale for the proposed change to the existing degree:

The CAS Department of Biology proposes to revise the existing Major in Biology with Specialization in Behavioral Biology. Specifically proposed is to replace the two-credit Seminar in Behavioral Biology (BI 224) that is required of all students in the major with a full four-credit required course (BI 225: Introduction to Behavioral Biology), which students will typically take as first-semester sophomores. Also proposed is to decrease the major’s number of four-credit general electives from five to four, thus decreasing the total number of biology prerequisite/principal/seminar courses required for the major from 12.5 to 12.0 (while maintaining the stipulation that two-four principal courses are taken in psychology and/or biological anthropology, and the additional requirement of related natural science and math/statistics/computer science courses). The combined effect of these two changes will be to strengthen students’ knowledge and understanding of foundations and current trends in the genetics, physiology, neurobiology, ecology and evolution of behavior, along with their skills in scientific research and writing, and to achieve these goals without making an already course-extensive major more so in terms of the total number of credits required.

In its current two-credit seminar format, BI 224 did not provide sufficient class time both to cover the fundamentals of the discipline (as is especially needed by those students whose AP biology courses did not emphasize behavior) and to integrate faculty research presentations that help prepare students to conduct
research in the labs of CAS behavioral biology faculty. The new introduction to behavioral biology course (BI 225) will more thoroughly address and integrate those two aspects of laying broad foundations and engaging students with the research community. In addition to writing individual research papers, students will demonstrate ability to analyze and evaluate scientific literature by working in groups to assemble a “journal special issue” of papers they consider to have advanced research in a given research area.

The inclusion of CAS BI 225 at 4 credits will be balanced, without any negative consequences for the overall learning goals of the major, by reducing the number of required general elective courses by one. Students will still acquire a breadth of knowledge across biology and related disciplines, complete a set of substantial biological laboratory/field experiences (at least three courses beyond BI 107/108), and, with two primary and four general electives, have the opportunity to pursue a plan of study that matches the requirements of the major to their individual interests within behavioral biology.

2. Please describe how the proposed change(s) advances the Strategic Plan of the school/college and of the University plan:

Enrollment in the Major in Biology with Specialization in Behavioral Biology has more than tripled since it was first offered in 2009, and currently totals 44. Consistent with the CAS strategic plan for “periodic, comprehensive review of current majors,” the instructor of the required Seminar in Behavioral Biology (CAS BI 224), who is also director of the Specialization in Behavioral Biology and adviser to all undergraduates enrolled in the program, recognized that the 2-credit seminar was not meeting the needs of all members of its intended audience. This on-going assessment of the Specialization has led to the revision of the seminar course and the current proposal to revise the requirement for the number of elective courses accordingly.

3. Please list the program requirements for the current and revised programs: (expand the table as needed and denote new courses in bold print)
<table>
<thead>
<tr>
<th>Current program</th>
<th>Revised program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biology I &amp; II (CAS BI 107 and CAS BI 108)</td>
<td>Biology I &amp; II (CAS BI 107 and CAS BI 108)</td>
</tr>
<tr>
<td>3 Chemistry Courses: CAS CH 101 (or 109 or 111 or 171) and CH 102 (or 110 or 112 or 174) and CH 203 (or 211 or 273)</td>
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</tr>
<tr>
<td>Bio Breadth: Cell, Molecular, Genetics: CAS BI 203 (or 213) or BI 206 (or 216)</td>
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</tr>
<tr>
<td>Bio Breadth: Systems Phys/Princ of Neurosci: CAS BI 315 or BI 325 (or NE 203)</td>
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</tr>
<tr>
<td>2 Primary Electives: chosen from a list of 8</td>
<td>2 Primary Electives: chosen from current list of 8</td>
</tr>
<tr>
<td>5 General Electives: (of which two in AN and/or PS chosen) from a list of 35</td>
<td>4 General Electives: (of which two in AN and/or PS chosen) from current list</td>
</tr>
<tr>
<td>Required Seminar in Behavioral Biology: CAS BI 224 (2 credits)</td>
<td>Required Intro to Behavioral Biology: CAS BI 225 (4 credits)</td>
</tr>
<tr>
<td>Required related:</td>
<td>Required related:</td>
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<tr>
<td>2 courses in Math (calculus and/or statistics);</td>
<td>2 courses in Math (calculus and/or statistics);</td>
</tr>
<tr>
<td>or one course in Math and one in Computer Science</td>
<td>or one course in Math and one in Computer Science</td>
</tr>
<tr>
<td>2 courses in Physics: PY 105 and 106; or PY 211 and 212; or PY 211 and 106; or PY 241 and 242</td>
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</tr>
</tbody>
</table>

**Other Biology Requirements:**

No changes are proposed to other rules (for upper-level coursework, courses with lab, counting directed study, etc.).
4. Please list learning outcomes for the revised program:

Learning outcomes are consistent with those of the initial program.

Students graduating with a Major in Biology are able to:

- Demonstrate knowledge of fundamental principles in each of three major
disciplines in biology (cell and molecular biology; neurobiology; ecology,
behavior and evolution), as well as foundational knowledge in related
sciences (chemistry, physics) and mathematics.

- Effectively search scientific literature for research relevant to a given topic
and critically assess the validity and significance of primary research
articles.

- Understand the scientific method, including the logic of experimental design
and hypothesis testing, and the genesis and resolution of scientific
controversy.

- Apply the scientific method in laboratory and/or field-based research,
preferably in the context of faculty-mentored, original research.

- Demonstrate an understanding of principles for the ethical conduct of
research, including best practices for the collection, analysis and
interpretation of data.

Students graduating with a Major in Biology with Specialization in Behavioral
Biology achieve all of the above outcomes in addition to those specified below:

- Students completing a Specialization in Behavioral Biology will
demonstrate broad understanding of the ecology and evolution of animal
behavior, including its genetic, hormonal and neural regulatory mechanisms.

These outcomes should be improved due to the broader introductory coverage of
topics in the discipline and greater emphasis on preparing students for specialized
research presentations by faculty. This should facilitate entry into undergraduate
research by improving student comprehension of concepts and methods in the
study of the biology of behavior.
5. How does the change place your program in the context of programs at peer institutions? To the best of our knowledge, there are no closely comparable programs at peer institutions or other institutions, although programs bridging psychology and neuroscience in the context of the biology of behavior exist. The undergraduate program in behavioral biology at Johns Hopkins bears some broad similarities in general science training and course offerings to our program, including a tropical biology option, but is more oriented toward brain science, psychology, biomedical application, systems neuroscience, and social science analysis, and less toward broad foundational studies in biological science, evolutionary ecology, and sociobiology. Our program also has a greater research focus on the field study of primate behavior.

The model of majors in “Biology with Specialization in [subfield]” is one that has been developed at BU in response to significant interest among current and prospective undergraduates. Other current specializations include Cell, Biology, Molecular Biology, and Genetics; and Ecology and Conservation Biology.

6. How does the change affect other academic units? There will be no significant impact on other academic units. The CAS Departments of Anthropology and Psychological & Brain Sciences, where students take electives for the major, are aware of the decrease in required general electives from five to four. No currently offered PS or AN courses are reliant for viability on enrollments from the BI specialization.

7. How will you notify current students of the proposed changes and implement the requirements? Current students will be notified by email and during advising. Since the two-credit seminar BI 224 will no longer be offered, currently declared majors who have not yet taken that course will be individually advised about how best to fulfill requirements for the major.

8. Please document any implications that the change has on professional accreditation or licensure at the program or school/college level: N/A

9. Please list the resources needed including IT, new faculty, new staff, reassignment of faculty from existing courses to new ones (especially if the existing course(s) is not being removed from the bulletin), technology enhanced classrooms, office space, and other facilities:

There are no changes in required resources.