Proposed Change to an Existing Degree Element (Specialization or Concentration) or Existing Minor: Academic Component

Please answer all relevant questions below. Consultation with the appropriate Associate Provost on a draft of the proposal is recommended.

Using the relevant template, please submit a budget even if no additional resources are needed.

Current Title of Degree (e.g., Bachelor of Arts in History):

Proposed Title of Degree or Minor (if the title is part of the change being proposed):

Bachelor of Arts in Chemistry and Physics (no change)

1. Please provide the name, title, email address, and phone number of the primary contact person for this academic program:

   Maria Kamenetska
   Assistant Professor, Chemistry and Physics
   Mkamenet@bu.edu
   212-358-3334
   617-838-5519

2. Please describe briefly the proposed change to the existing degree:

   Wish to change the organic chemistry requirement as currently in the BU Bulletin from “CH211” to “CH211 or CH203” to make it the same as all other allowed paths for the Chemistry major. It also follows that the Chemistry elective courses would allow for CH 204 (203’s following course) to be considered as an acceptable elective.

3. Please provide the academic rationale for the proposed change to the existing degree. This may include aspects related to budgetary issues, student demand, or peer/disciplinary trends:

   Restricting the required organic chemistry course to just one option reduces the flexibility afforded to other chemistry majors where any of the three paths is acceptable. This proposed
change will make the Chemistry & Physics major in line with the other varieties of the Chemistry major, allowing the students to tailor the courses to their interests and strengths. This flexibility is also necessary as course scheduling conflicts between Chemistry and Physics have been noted and can be resolved by the proposed changes.

4. Please list all the minor, specialization, or concentration requirements for the current and revised programs so that review committees can easily see the changes: (Expand the table as needed and denote new courses in bold print and courses already approved for conveying Hub units with an asterisk. Note: New courses included in the degree that are intended to convey Hub units must be submitted separately for Hub unit approval via CourseLeaf)

<table>
<thead>
<tr>
<th>Current program</th>
<th>Revised program</th>
</tr>
</thead>
<tbody>
<tr>
<td>CAS CH211 Intensive Organic Chemistry I*</td>
<td>CAS CH211 Intensive Organic Chemistry I* or CH 203 Organic Chemistry I*</td>
</tr>
<tr>
<td>Chemistry elective: CH 212 Intensive Organic Chemistry II* OR CH 303 Instrumental Analysis Lab OR CH 455 Advanced Computational Chemistry OR CH 550 Materials Chemistry</td>
<td>Chemistry elective: CH 212 Intensive Organic Chemistry II* OR CH 204 Organic Chemistry II* OR CH 303 Instrumental Analysis Lab OR CH 455 Advanced Computational Chemistry OR CH 550 Materials Chemistry</td>
</tr>
</tbody>
</table>

5. Is this change the result of program learning outcomes assessment and/or academic program review?:

No, advising sessions for students interested in the new major have identified this issue.

6. Does the change impact learning outcomes for the overarching program? If so, how?:

No
7. How will you notify current students of the proposed changes and implement the requirements? How will you assure that current students are able to complete their programs under the requirements that were in place at the time of their matriculation?

Advising, BU Bulletin, emails to Physics/Chemistry majors, etc. and anything else you feel is useful.

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

N/A

9. If the change includes a new course or courses, please indicate who will teach the course and how the rest of that faculty member’s course load will be affected (courses(s) redistributed to other faculty, taught less frequently, no longer taught, etc.). Please be specific about affected courses. This information should be reflected in the budget form that accompanies the proposal, e.g. the cost for a new faculty member to teach the new course or a redistributed course:

N/A Proposed courses already exist with the necessary capacity.

10. Please describe the budgetary impact that the proposed change will have and list other resources needed including new staff, IT, technology enhanced classrooms, office space, and other facilities. This information should be reflected in the budget.

No impact.

11. Please provide the bulletin copy (exactly as it should appear) related to the proposed change, including all text connected to the program (requirements, description, learning outcomes)[NOTE: this bulletin copy is in a final form and cannot be changed. It must include program learning outcomes.]

BA in Chemistry and Physics

The joint Chemistry and Physics major at Boston University incorporates the core elements of chemistry and physics to enable an interdisciplinary study of the structure and properties of atoms, molecules and materials. The degree provides a more extensive foundation in physics and theoretical methods than a traditional Chemistry Major, and a robust background in organic, inorganic, physical chemistry and experimental chemistry techniques. This curriculum which carefully combines courses in the two disciplines positions the students well for graduate work at the interface of chemistry and physics in fields such as chemical physics, biophysics, molecular engineering, material science or others. These fields at the interface are central to emerging
research directions in quantum computing, quantum materials, molecular electronics, nanomedicine, environmental engineering among others. The major may also be suitable for students whose career goals lie in medicine. Chemistry and Physics majors will be advised by a faculty member with a strong affiliation to both departments.

Learning outcomes

- Students completing the BA in Chemistry and Physics will have:
  - Knowledge of fundamental concepts in physics and chemistry.
  - Laboratory skills, including in physical chemistry and in foundational physics experiments.
  - Foundations in mathematical and modeling methods
  - Combined theoretical, experimental and computational skills to apply to real-world problems in molecular science.

Requirements

All BU undergraduate students, including both entering first-year and transfer students, will pursue coursework in the BU Hub, the University's general education program that is integrated into the entire undergraduate experience. BU Hub requirements can be satisfied in a number of ways, including coursework in and beyond the major as well as through cocurricular activities. Students majoring in Chemistry and Physics will ordinarily, through coursework in the major, satisfy 16 or 17 units of the HUB requirements, including Quantitative Reasoning 1 and 2, Scientific Inquiry 1 and 2, 2 units of Critical Thinking, 2 units of Research and Information Literacy, 2 units of Teamwork and Collaboration, 1 unit of Creativity/Innovation, 1 unit of Digital/Multimedia Expression, 1 unit of Oral and/or Signed Communication, 1 or 2 units of Writing-Intensive Course, 1 unit of Writing, Research and Inquiry and 1 unit of Historical Consciousness. Remaining 9 or 10 BU Hub requirements will be satisfied by selecting from a wide range of available courses outside the major or, in some cases, co-curricular experiences.

Unless otherwise noted, all required courses are 4 credit hours.

Prerequisite Courses [4 physics classes + 4 chemistry classes + 2 or 3 math classes]:

- **MA 123 Calculus** (4 credits) & **MA 124 Calculus II** (4 credits) or one (1) of the following:
  - MA 127: Enriched Calculus, MA 129: Honors Calculus or equivalent
- **MA 225: Multivariate Calculus** (4 credits)
- **CH 111 Intensive General Chemistry with Quantitative Analytical Lab I** (4 credits) & **CH 112 Intensive General Chemistry with Quantitative Analytical Lab II** (4 credits) or
  - CH 109 Advanced General Chemistry with Quantitative Analysis Lab I (4 credits) & CH 110 Advanced General Chemistry with Quantitative Analysis Lab II or
CH 101 General Chemistry I (4 credits) & CH 102 General Chemistry II (4 credits) & CH 201 Quantitative Analytical Chemistry Laboratory (2 credits)

- PY 251 Principles of Physics I (4 credits) & PY 252 Principles of Physics II (4 credits) or
  - PY 211 General Physics (4 credits) & PY 212 General Physics (4 credits)

- CH 211 Intensive Organic Chemistry I (4 credits) or
  - CH 203 Organic Chemistry I

- CH 232 Inorganic Chemistry (4 credits)

- PY 251 Modern Physics (4 credits) or
  - PY 313 Elementary Modern Physics (4 credits)

- PY 355 Methods of Theoretical Physics (4 credits)

**Principal Required Courses [4 chemistry and 2 physics OR 2 chemistry and 4 physics OR 3 physics and 3 chemistry]:**

- PY 405 Electrostatics (4 credits)
- PY 451 Quantum Mechanics I (4 credits) OR CH 351 Physical Chemistry I: Quantum Mechanics (4 credits)
- PY 410 Statistical Thermodynamics (4 credits) OR CH 352 Physical Chemistry II: Statistical Thermodynamics (4 credits)
- CH 354 Advanced Physical Chemistry Lab (4 credits)
- Physics elective: PY 406 Electromagnetism II OR PY 408 Advanced Mechanics OR PY 452 Quantum Mechanics II OR PY 421 Computational Physics OR PY 581 Advanced Physics Lab
- Chemistry elective: CH 212 Intensive Organic Chemistry II OR CH 204 Organic Chemistry II OR CH 303 Instrumental Analysis Lab OR CH 455 Advanced Computational Chemistry OR CH 550 Materials Chemistry

**Honors Thesis Option**

- CH 401 & CH 402 Honors Research in Chemistry (8 credits) OR PY 401 and PY 402 Honors Research in Physics

12. For proposed changes to format of existing programs, please provide an indication of non-standard scheduling for the proposed format:

N/A

13. Please provide a communication and promotion plan for the proposed changed format. Are you working with an outside vendor/contractor? If yes, please outline this relationship and the role of the vendor:
N/A

14. If applicable, please provide a request for non-standard tuition rates for the proposed changed delivery format:

N/A

15. Does this change affect the charges (tuition, fees, etc.) to be applied to this program?

N/A